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COMPUTER WEEKLY

Swedes plan guidelines for technology

A WATCHDOG has been set up by the Swedish government to study how computers are being introduced in Sweden and draw up guidelines for usage and development of new technology. A combined policy for industry, government and society at large will be worked out, and when thought necessary legislation will be recommended to Parliament.

The aim of the committee, called the Data Delegation, is to get a clearer idea of what effects computerisation will have on industry, government, and society, covering such areas as unemployment, working conditions, the distribution of power in society, and privacy. There are already several bodies working on these specific areas in Sweden, and the Data Delegation is to co-ordinate their efforts.

The delegation does not fit in a formal way into the Swedish constitution but it is considered important enough to have a Cabinet Minister as chairman: Olaf Johansson, the Minister for the Budget. The 15 members consist of MPs from all five parties, regional and local government officials, and trade union representatives. Also there will soon be seven full-time staff.

The committee will probably not have any official power apart from its co-ordinating role between existing agencies, nor will it have money to spend; its main influence would be in proposing legislation and regulations. Some of the existing agencies, such as the Data Inspection Board, are understood to be worried about interference from the delegation.

Delegation staff say it might have been a good thing had the body been established five years ago. The sort of problems that could have been avoided include eye strain in workers using VDUs and a reduction in the traditional free availability of Swedish government information to citizens since much administration is computerised.

NEWS IN BRIEF

Trouble looms again at Times

CONFRONTATION at The Times over new technology is again looming, eight months after the newspaper's suspension was ended in relative amity.

Times management is pressing the NGA, the typesetters' union, to discuss direct input of text by journalists and advertisement staff, while the union refuses to enter such talks, claiming it has a monopoly of keyboarding for three years.

Prescriptions trial

COMPUTERISATION of part of the Prescription Pricing Authority is to go ahead as a trial to see whether the whole authority should be similarly automated. Studies on alternative ways of doing this have been going for some time (CW, October 19, 1978). The authority pays chemists for the prescriptions they dispense.

Power monitor

THE Hunterston nuclear power station in Scotland is to enhance its plant monitoring system with two Honeywell Level 6 Model 43 systems. Linking with existing 316 real time interface equipment, they will provide plant control room staff with status information about the plant's two reactors and generators.

Data entry boost

SOFTWARE to support data entry and file inquiry at up to three work stations has been added by NCR to its Intel 8080-based 8150 office computer. Called Multi Work Station Direct Processing System, the software rents for £330 a month.

Go-ahead urged for voluntary codes

VOLUNTARY adoption of codes of practice governing personal data in files should go ahead now, to test their practicality before they are embodied in legislation. That is the recommendation of the National Computer Users Forum, tentatively endorsed by a partial survey of members of the National Computing Centre.

The forum has told the Department of Industry that it is "gravely concerned about giving legislative enactment to the proposed codes of practice until sufficient experience is established." The NCC members said that, in the absence of government action, voluntary codes would be acceptable.

Only 10% of NCC members were questioned in the survey. Of the 200 respondents 90% felt there was a need for some form of privacy regulation soon, 75% were in favour of legislation, but only 50% regarded a statutory data protection authority as essential.

Only half of the members replying had studied the practical implications of the Data Protection Committee's recommendations on their businesses. One-third had assigned responsibility for privacy to someone in their DP departments.

The forum has also recommended that codes of practice should encompass manual systems as well as automated ones, but two forum members — the Central Computers and Telecommunications Agency and the Mail Order Traders Association, dissented from this, stating: The Mail Order Association and the Building Societies Association both felt that codes should be voluntary and that legislation should "only be enacted where necessary".

Sacked salesman sell Jaoquard kit

THREE sacked Jacquard salesmen and three others have gone into business on their own to distribute the firm's word processing and small business equipment, only weeks after the direct sales operations they worked in closed down (CW, June 12).

The Knightsbridge-based firm, called Wordata, is headed by former Jacquard London branch manager Mario Guzzetti, who was offered a distributorship by his old firm.

Canada books 20 stands at Compec

THE largest stand yet booked at Compec has been reserved by the Canadian government for its Department of Industry, Trade and Commerce.

Nearly 30,000 sq ft, the area of 20 stands, has been reserved for Canadian exhibitors, and many will be taking part in a UK technical exhibition for the first time.

Compec, the UK's major show of computer equipment and development, is at London's Olympia from November 4 to 8. This year's exhibition will be the biggest so far, with the Grand Hall and gallery completely full. So far 380 exhibitors have booked 788 stands and only a few units are now available to enable latecomers to take space.

Last year's record attendance was 34,745, 22% up on 1978, the first year that Compec was held in Olympia. It is expected that 1980 will surpass those totals.

Advance tickets at £1.50 each can be ordered from IPC Exhibitions Ltd, 40 Bowling Green Lane, London, EC1R ONE. Tickets bought at the door will cost £2.

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Denial of Inmos change

● From front page

consideration the options open to it.

Strings that may be attached to any further State funds could swing the Inmos directors to take the whole project out of the UK and base all future development at the US site at Colorado Springs.

Although the government appears undecided about the worth of Inmos, the company is ahead of the field with its static RAM, the IMS 1400, which it is expected to start sampling towards the end of this year. Intel, the only company with a comparable product, is understood to have scheduled the sampling of its 2167 for the early months of 1981.

That is about the time that Inmos hopes to start sampling its 64K dynamic RAM. Design work is also well ahead on other memory products.

Work on the company's plant at Cheyenne Mountain, near Colorado Springs, is up to schedule and planned output there will be based on 2,000 wafer starts a week. Capacity at the projected UK factory would double that.

At present the research team at Bristol employs about ... people but recruiting has been hindered this year because of the uncertainty of the future of the venture.

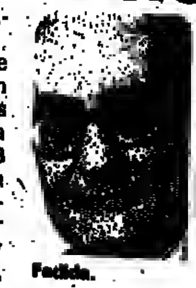
OBE for viewdata inventor

INVENTOR of viewdata Sam Fedida has received the OBE in the Queen's Birthday Honours. The award follows closely on that of the MacRobert Award for technological innovation which went to Fedida for his work on Prestel, the Post Office version of viewdata (CW, December 13, 1979).

Fedida led the Post Office team that developed viewdata in the early Seventies. On his retirement in 1978 he became a consultant to Insac, the NEB subsidiary marketing viewdata in the US. When these operations were extended last year with the formation of a new company, Aregon International, Fedida became technical director. He is now an independent consultant.

Another OBE goes to Steve Shirley, chairman of F International. She founded Freelance Programmers in 1962 to provide part-time work at home for women who were trained programmers but who had given up their jobs to raise families. This proved a highly successful venture and in the early Seventies, the company expanded with the establishment of systems operations and changed its name to F International. Mrs Shirley is also a leading member of the BCS specialist group for the disabled.

Other honours include a life peerage for Sir Arnold Weinstock, managing director of GEC;



Fedida.

Shirley

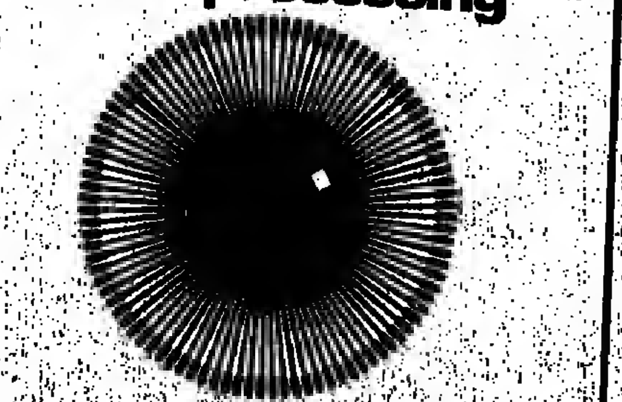
and an OBE for Professor Kenneth Hunt, who holds the chair of computer service at the Royal Military College of Science, Shrivenham, Wilts.

An MBE goes to Cecil Rickerby of the Operational Programming Department at the Post Office Telecommunications Headquarters.

GEC picketed

PICKETING began on Tuesday at GEC Telecommunications in Coventry where 200 System X development engineers have been locked out during a dispute about pay and conditions (CW, June 12). ASTMS has made this dispute official.

'One-stop' supplies for word processing



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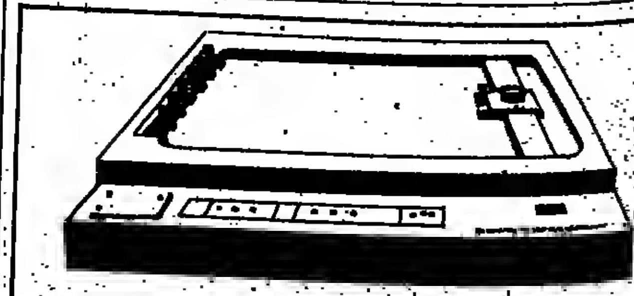

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Briefing

$412m deal for Honeywell

HONEYWELL has been awarded a new 0-year maintenance contract by the Pentagon on the 35 ageing Honeywell 6000 mainframes that form part of the US Air Force's world wide military command and control system, WWMCCS. The $412 million contract includes $100 million worth of hardware updates.

The much criticised WWMCCS achieved further notoriety recently for generating two "Soviet attack" false alarms. They have been attributed to a defective chip.

16-bit Level 6

HONEYWELL is working on a 16-bit microprocessor version of its Level 6 minicomputer, following the path set by Texas Instruments with its TMS 9900 and Data General with its Micronova. Smallest Level 6 processor currently available is the 6/23, which is an AMD 2901 bit-slice emulation of the basic processor.

System 38 Cobol

IBM has announced an Ansi 74 Level 2 Cobol compiler for its System 38 business database computer, hitherto only offered with RPG III. The compiler, costing £60.20 a month will be available in 1981.

CSS layoffs

NATIONAL CSS is merging its computer marketing and time sharing divisions in the US and making big layoffs. The combined division will market both remote time sharing services and the NCSS 3200.

MP calls for national Info Tech plan

A NATIONAL strategy for information technology should be set up by the government right away in order not to let the immense opportunity in this industry "slip between our fingers." That is the proposal put to Industry Secretary Sir Keith Joseph by Kenneth Baker MP, chairman of the Conservative Backbench Industry committee. Sir Keith reacted sympathetically to the proposals, Baker told CW, and is now awaiting reports on further action by his department.

According to Baker, a single policy document on Information Technology in the UK in the 1980s needs to be produced as an outline of the strategic thinking of the industry, to show the opportunities that exist and how they can be maximised. Baker also reiterated the call for the appointment of a Minister for Information Technology to act as a focal point in government to draw the diverse parts of the industry together.

The government should take a lead by introducing more information technology into its own operations, Baker said, for instance office automation in Whitehall, the use of Prestel, and more computers in the Health Service. These should all be procured from UK firms.

Baker's other proposals include: adjustment of corporation tax so as not to discriminate against the services industry; an all-UK procurement policy, not just benefiting ICL; increased research and development; and promoting by the new minister of technology agreements with unions.

The new ministerial post would not entail extra bureaucracy, Baker said, because the departments involved already exist.

IBM aims for bigger WP slice

The elements of IBM's new word processor, the Displaywriter, are shown here. Only announced in the US so far, the Displaywriter features a 50,000 word dictionary used for automatic checking of spelling. Users can add another 500 specialist words of their own.

The configuration shown here costs about $10,000.

● More details of the Displaywriter can be found on page 3.

TO help it win a bigger share of the word processing market in the US, IBM has launched a low cost word processor and made major changes to its traditional sales policy. Meanwhile in Europe it is offering OEM peripherals for the first time.

Stung by the way it is Number 2 to Wang in the US word processor market, IBM is now enabling its customers to buy word processing equipment from whichever division is their principal supplier and data processing, general systems and office products salesmen are to get incentives to push the word processing products of rival divisions.

As well as the new stand alone Displaywriter from office products division, which has a base price of $7,895, IBM has added arithmetic and file processing facilities to the 5520 shared logic word processor from general systems division, and announced that from next summer, users of the 8100 distributed processor will be able to run the 3730 word processing software under its DPCX operating system.

Only the last has been announced in the UK so far. The 5520, discussed two weeks ago (CW, June 12), is not yet available outside the US.

The US announcement is accompanied by a "statement of direction" from IBM which says that its intention is to provide,

● Turn to page 5

Ferranti must stay British

THE government will not allow Ferranti to be sold to a foreign company, because of its strategic importance as a defence supplier, Industry Secretary Sir Keith Joseph has announced. He has made no other commitment in advance of this week's decision by the Cabinet on how to sell the National Enterprise Board's shares in the company, following publication of its annual results.

Sir Keith made it clear, however, that he dislikes the idea of selling to anyone other than the highest bidder, despite fears that a takeover by a giant such as GEC could lead to the closing down of much of Ferranti. Scottish finance houses have proposed that they should be sold the company under a restrictive covenant that would keep Ferranti independent for an initial period of two or three years.

Staff at Ferranti's Scottish factories are particularly worried about a takeover, and ministers at the Scottish Office, known to be sympathetic, have been pressing this point with Sir Keith.

DEC shortages

A HOLD-UP in the full production of Digital Equipment PDP-11/44s has created a serious shortage of PDP-11/34s according to two of DEC's OEM customers, Bunzl Data Systems and CBS Consultants of Birmingham. The 11/44 is intended to supersede the 11/34 and offers twice the power at only 10% greater cost.

OFT, ICL agreement is 'a sell-out'

AFTER several years of complaints by users and manufacturers, ICL has been forced by the Office of Fair Trading to change some of its practices relating to the maintenance of old machines and the attachment of non-ICL hardware to ICL systems.

However, the changes are far from satisfactory according to some of the complainants and ICL is still the subject of an investigation by the EEC Commission that started in 1978 (CW, September 21, 1978).

The most significant aspect of ICL's policy not to be changed is the limitation of guaranteed maintenance to seven years on most machines. John Young of Computer Resale Brokers, the most vociferous of the complainants, has described the agreement between ICL and the OFT as 'a sell-out'. He said that ICL maintenance policy had rendered old 2903s and 2904s virtually worthless following the launch of the ME29, and he pointed out that the maximum guaranteed maintenance period on the ME29 was only five years so that ME29s would lose all their value even quicker than 2903s and 2904s.

However, one significant change made by ICL is that it will no longer apply a 20% surcharge for maintaining machines that it agrees to service after the seven-year contractual period is complete. Stuart Gould, chairman of the ICL Computer Users Association, said that this would be welcomed by users but added they would continue to talk to ICL about the maximum guaranteed maintenance period.

The OFT itself said in its statement on the agreement that it reserved the right to re-open its discussions with ICL if "new significant evidence appears".

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Advertisement Manager
Harry Hutson 61-261 6356
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Brian Durrant 61-261 8597

Publishing Director
Dr J. A. G. Thomas

Editorial Director
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Telephone 01-261 8000
Telegrams/Telex: 28137 BISPRS G

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Manchester: Grove House, Skerton Road, Old Trafford, Manchester, M16 0WG.
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COMPUTERVIEW

ONE of the dispiriting pieces of news this week is that, while the latest attempt to establish an annual pan-European exhibition dedicated solely to software is being staged by a UK company, the venue chosen for the show is Paris (see Software File). One does not need to look far to understand why.

IDC Eurocast has produced a study on European software and services 1978-82*, which lists the top 50 companies in the field in Europe. Figures are for 1978 and, needless to say IBM is number 1. But the next four are all French and include GSI, the software and services offshoot of CGE; the Cap-Gemini-Sogeti group; CISI and SG2. These together did business totalling $435.8 million, as against IBM's $394.4 million. The rest of the top 10 shows Gelsco of the US, two more French companies, Datav of West Germany and NCR, also American.

A French, a Swedish, a US and a Swiss company are ahead of the first UK entrant in the list, BOC Dataaolve, which is Number 15. Computer Management Group is the next UK entrant in 30th place, followed by Scicon, 40th, Logica 43rd and Centre-file 44th. France has 14 companies in the top 50, UK has five — and even Denmark has four.

Dr Chris Wilson's drive to expand ICL's software and service businesses at a much faster rate than the overall growth of the company has come none too soon. But as in the training field, itself a service, the rest of UK industry seems largely to be content to let ICL make the running.

In the debate which started two years ago about the microprocessor and all its works, little attention was given to key significance of software and software skills. While the Microprocessor Applications Programme allocates capital for development, what beleaguered microsoftware and systems houses really need is much more fundamental.

Those companies, and their counterparts abroad will play an increasingly significant role in the computer industry of the 1980s. Yet, as Martin Banks pointed out (Micro News, June 19), they are being squeezed by dealers out to make a killing, and by customers, particularly big companies, who never pay their bills until the last possible moment.

The government has said that every assistance should be given to small businesses — and few businesses have more potential than the small systems houses. The kind of assistance they need is much more than money for development of applications which may or may not be of any value, is support once applications have been demonstrated to be successful. Far better a tax or VAT holiday for the first five years of trading than grants.

Because the UK was the European pioneer of mainframe computing its software and systems companies got a head start in the international race to offer ancillary services. Despite this the French are now way ahead.

The UK, France and West Germany have tended to dominate the European-owned market for computers and computer services because size of market is an important determinant in the ease with which a country could afford to buy large and expensive computers.

It is just as easy to start a successful microcomputer systems house in Holland as it is in the UK and — if this first climate is more congenial there than in the UK — Holland, Belgium or Denmark may well produce the micro software giants of the 1980s while the UK remains a country of minnows.

Few dispute that micro software will be a very big industry by 1990. But how much of it will be British?

*Services and software 1978-1982, £880 in Europe. Ltd (CW), 2 Bath Road, Chiswick, London, W4 1LN. Tel: 01-995 9222.

LETTERS to the EDITOR

TPS3 is to save K, not to threaten it

ALTHOUGH I welcome any mention of our product in your pages I must protest at your headline, "TPS extensions a threat to VME/K" (CW, April 3).

If I have been saying anything coherent for the last four years it is that for the prospective user of 2900 machines in a TP environment, VME/K is not just a good thing, it is THE good thing. This I believe because the underlying philosophy of the allocation of resources in K makes for the best possible application of the basically unfavourable VM environment to TP systems.

Quite contrary to your headline, our purpose in announcing TPS3 at this time is to save K, not to threaten it. If there is a threat to K it must clearly come from the ME20. With noticas in the Press speaking of processor power up to five times that of a 2904 and main store sizes of up to a megabyte, hotly followed by the announcement of 2946, 2950 and 2958 models 20 with TME, the gap in the market for 2900s under VME/K would appear to be shrinking rapidly.

But why, you may wonder, should I care about the demise or otherwise of VME/K, given that our own product, TPS, is very happy in any of the available environments? To understand this you must recall that we, along with a handful of other brave advanturers, actually market microprocessor-based terminal systems for ICL machines. The hazards of this activity are only increased if a large proportion of potential users are holding back development of terminal-oriented systems to await some Utopian environment announced but not quite available yet.

What causes me concern, therefore, is the announcement of yet another "new" TP system which this time "TME incorporates". This use of the present tense should really be controlled by advertising standards! Setting an objective and commencing the recruitment of a development team should not be allowed to equate to the possession of a product.

The real significance of TPS3 is that serious users can continue (or start) to develop and use serious TP systems now, and eventually run them on whatever stable base actually reaches full development. Please, ICL, let it be K; at least that is just around the corner . . . or is it?

JOHN GARRICK
Director
Telecomputing,
Oxford.

A formula for finding recruits

HAVING spent the last two years selecting, training and placing juniors in data processing, may I comment on F. J. Perkins' letter about the alleged failure of universities to provide suitable people for the industry (CW, April 10).

The "natural" will come through smelling of coding sheets and core dumps from any entry point, but the cost-effective solution for which your correspondent is looking does not lie in public sector education, whose basic raison d'etre is not yet (if ever) to suit an operation's requirements, the formula for providing juniors which P.J. Perkins demands is as follows:

Rigorous and uncompromising selection by practising DP professionals (our final acceptance is in the order of 10% of the original applicants), whereas in the State sector colleges are often obliged to take students who have elected to do computing

using academic achievement as a main entry qualification);

Intensive training over a period of between 14 and 22 weeks, again by practitioners with experience of latest products and techniques;

Placement in a post suited to the student's ability and personality — systems or programming, user or software house.

The next question must be: Who pays? While the government has sponsored my work so far, it cannot be expected to pay the full bill and we are currently discussing with a number of clients the user group idea, in which we can put up a cost-effective package as an alternative to the use of contract staff or staff recruitment.

ROBERT MOSCROP
Education Director
Applied Bliss Associates,
[illegible]

Opportunities for non-whites

ALLEN COOK expressed his views about South Africa with unambiguous phrases (Letters, June 12). However, he may have misled readers about the real state of affairs. Although I understand Mr Cook's feelings (especially since he has decided not to live in that country in defiance of apartheid), I feel his attack on Mr Gray (Letters, February 7) and people of similar attitudes is quite unjustified.

During a stay in Johannesburg I heard Mr Grey speak at a conference about the opportunities which now exist for non-white computer staff (and the computer industry is probably no different from others in this respect). Moreover, I saw for myself how organisations are within the framework of the law, recruiting, training and using black, Asian and coloured men and women without prejudice.

These attitudes should be encouraged. It is unworthy of Mr Cook to denounce the agent for change involved — expatriate or not.

M. V. E. MOORE
Malmesbury,
Wilts.

Relational DBMS

IT is good to see Computer Weekly back again, but I was surprised to see the headline "Relational Databases Just Around The Corner" on an NCC report (CW, June 12).

Logica's relational database system Rapport was launched eight months ago, with over 40 systems sold now, it is hardly "just around the corner". I should like to correct any impression your readers may have that relational databases are a thing of the future.

Rapport does not implement the full Relational Algebra, but then relational purists will have to wait a few years for the system of their dreams. In the meantime, Rapport certainly fits Dennis McLeod's description of relational as "flat files independent of data, and a high-level data sub-language for data manipulation", and our users are finding it a very practical DBMS.

R. P. WORDEN
Business Manager,
Technical Group
Logica,
London.

1984 and all that...

Some people say that the things people say in the media about computers was begun by Bell Telephone Laboratories in 1925 by Dr. Alexander Graham Bell, Thomas A. Watson and Walter S. Gifford. The first transcontinental telephone line was completed in 1915. The first transatlantic telephone service was established in 1927. The first commercial telephone service was established in 1927. The first commercial telephone service was established in 1927. The first commercial telephone service was established in 1927.

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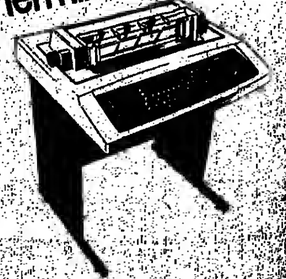

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Bitter blow struck for PoS in pubs

THE new look in point of sale terminals in evidence at EPOS 80 exhibition in London was units with five-inch VDUs instead of single-line displays. Attacking a highly specialised market was one of the latest developments, on electronic till for pubs and restaurants with a wide range of accounting and stock control facilities.

The distributors, Zonal, a new Edinburgh-based company, already has some large breweries interested in this machine, which has dedicated touch-sensitive keys for most frequently ordered drinks, with price information stored inside.

Less frequently sold drinks are entered as two-digit codes, and stock records in the machine are automatically reduced with each sale. A repeater television display can show the customer the details of his order as it goes along.

Other new point of sale terminals were on show from Real Time Control, Feigh, Quality Systems International and NCR. The NCR 2152 department store system is entirely "soft", so it can be customised for each installation. It has an alphabetic display for operator prompts and check-digit verification.

QSI is a new company whose terminal, built under contract by Plessey, incorporates a bubble memory for the price look-up table, two electrosensitive printers, a 16-character alphanumeric display, and a 3M data cartridge unit for recording transactions.

Zonal's PoS terminal for pubs and restaurants.

Case introduced its Midnight Modem, a 1,200 bps unit specially designed for automatic night-time data collection from PoS terminals by a central computer via public telephone. It is faster than equivalent Post Office offerings.

Call to halt use of bar codes in favour of OCR kit

BAR codes and laser scanning for point of sale systems should be halted and OCR scanning introduced in its place as cheaper and more convenient.

That is the view of Hans Scholze, managing director of the West German company Scantron, backed up by the West German Federation of Industry and the West German Association of the Retail Trade, both of which have declared their opposition to bar coding.

Scholze's firm has developed an omni-directional OCR scanner which can read article numbers on goods printed in either OCR-A or OCR-B fonts. The object cannot be moving while the number is read as with laser scanners — it has to stop for a moment on a glass reading plate — but the numbers can be orientated any way while it is being read. Scholze claims his system can be operated just as fast as a laser scanner and is cheaper and saves expense in printing the labels.

A maximum of 13 digits is available, while the Scantron scanner can read up to three lines of 14 alphanumeric characters each. Bar codes also require high precision in printing while very crude printers can produce OCR type, Scholze says.

The Scantron machine uses a television raster scan rather than a laser, and special hardware for decoding the image. A single solid line is needed under the printed number to show the scanner which way up the number is.

Gordon Strickland of Sweda, manufacturers of point of sale terminals that can be interfaced to any reading device, commented that the requirement for bringing each object to a stop would make the OCR system unsuitable for check-outs, and that bar codes have too big a head start.

Office challenge by IBM

MOST dramatic of IBM's new products is the Displaywriter from office products division, which effectively kills the Office System 6.

The Displaywriter consists of a CRT display which is claimed to be almost flicker-free, driven by a microprocessor which cycles at 200 nanoseconds and has a 16-bit bus. In the US a basic system with one 284K-byte floppy, and printer with Selectric typewriter mechanism will cost $7,805 plus $15 a month for the software.

A configuration with daisy-wheel printer and two floppy discs is the minimum which is competitive with other systems and will cost $10,070.

Up to three screens can be linked in a cluster sharing a printer and clusters can be chained. Screens with 160K-bytes of memory cost $3,310 and maximum main memory is 224K-bytes. Price for 64K-bytes is only $900, equivalent to $14,400 per megabyte. Memory chips are 16K-bit.

The system is modular and, within the limitations, users can mix and match at will. First deliveries are in January 1981.

From general systems division, file processing and arithmetic software has been added to the 5520 word processor so that users can produce things like management summary reports and budget preparation.

Also added to the 5520 is bisynchronous communication with a local or remote IBM mainframe.

The only part of the announcement currently offered in the UK is the facility to run the word processing software developed for the 3730 on the 8100. The 8100 is the much more powerful replacement for the 3790 distributed processing system, and the software, called Distributed Office Support Facility, runs only under DPCX.

EEC to back Euro ports data system

THE £1½ million project for a European ports information system (CW, June 19) is to be based on a central computer supporting a terminal installed in each of the participating EEC countries. The project is being backed by DG II sections of the EEC Commission, and project leader is Alfredo Sarich of the commission.

"There will be one year for specification of the system and one year for the experimental link to operate," Sarich told Computer Weekly. "The contract to develop the software and run the central system is worth 110,000 units of account — about £85,000."

An existing bureau computer is envisaged as the central system, supporting a terminal in each country, not necessarily at the participating port. The ports involved are Antwerp, Bremen, Copenhagen, Genoa, Glasgow, Hamburg, Le Havre and Rotterdam.

"The capacity of the system is to be of the order of 20,000 sailings and a database consisting of the characteristics and relevant history of individual vessels will be compiled. These will be culled from the Lloyd's of London database. A series of statistics on each sailing, giving details like times of departure and draught, entered before the ship leaves port.

A second part of the project is a feasibility study into adding a dangerous goods reporting system to the movements database. This will involve finding a universal means of notifying destination ports of dangerous cargoes coming in, and examining ways of improving the handling of dangerous goods within the port area. It will use standards already drawn up by international bodies.

The allocation for it is 400,000 units of account (£250,000) and a study team under Captain Stander of Bremen and made up of ports personnel is to handle it.

"The third part of the project will be the realisation of a final data processing and transmission system in EEC ports," says Sarich.

French buy Logabax

FRENCH computer and military electronics group Intertechnique is to take over control of Logabax from the Belgian Electrobel group.

The computing division of Intertechnique, which builds OEM minicomputers and Réalités business systems, is likely to be merged with Logabax, which makes office computers, terminals and OEM printers.

It is reported that Electrobel will retain a 20% stake in the new company, while a new holding company will have the rest. Shareholders in the new company will be Intertechnique with 62%, Société Generale with 18% and Industrialist Marcel Dassault with a personal holding of 10%. In addition, Electrobel is to take a stake of about 8% in Intertechnique through an issue of new shares.

Logabax made a loss of about £4.5 million on turnover of about £52 million last year. The combined Intertechnique Informatique-Logabax company will have an annual turnover of over £80 million.

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Downtime

by Chad

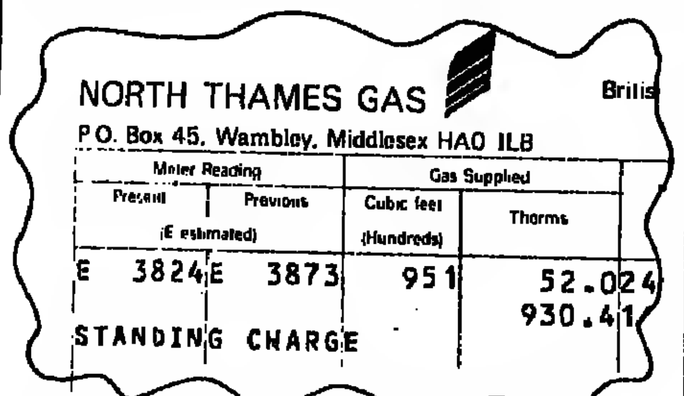
Wrong note

I REMEMBER years ago my father trooping around shops after my mother, looking at refrigerators or whatever, and on being shown the latest model with all its fancy features, remarking sourly, "I suppose this one plays a tune." Nowadays of course, he would be right.

I was strolling past the Sharp stand at an exhibition the other day and there, lo and behold, was an electronic cash register which played a tune.

I asked the chap on the stand what the purpose of the tune-playing was, and he replied with refreshing candour that he had no idea.

The speaker on the machine is principally for repeating to the world in a Dalek voice what the total is that is already shown on the digital display.



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			930.41
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I USED to wonder why it was always the Gas Board that was the butt of computer atrocity jokes. This bill which Mrs Wilson of Edgware has just received shows why. According to the North Thames Gas Board, 3824—3873=951. Apparently the "present" reading was not estimated but was an actual one. Be that as it may, hands up the naughty programmer who forgot his overflow routine!

Date a cow!

WORD reaches me from Ontario that an enterprising firm has started a computer dating service for cows, to enable our bovine friends to find suitable partners for rolling in the hay. I hope it works better than the corresponding human services. I will refrain from making any related remarks about the companions these have produced for me.

However, I am reminded of the story about the small boy at the country school who was late one morning. When quizzed about this by teacher he replied, "Oh, I had to take the bull to the cow."

"Can't your father do that?" asked the teacher.

"Oh, no, it has to be the bull," came the answer.

MICHIE'S PRIVATEVIEW

'Man's brain is the computer— his mind is the programmer'

AFTER my arrival at Rugby School at the age of 13, I and a fellow inmate were selected by the Head of House to be his fags (personal slaves) — not, as readers of Tom Brown's Schooldays might surmise, on account of our personal attractions or fawning demeanour, but because of our known readiness in theological discussion.

Our 17-year-old master, a raven-haired beanstalk with hollow cheeks and tireless intellectual intensity, in later life became a Jesuit priest. Now, however, his restless inquiries were frustrated by total unwillingness on the part of his contemporaries even to listen, let alone discuss with him his concerns about religion.

I and my co-fag, now a Companion of the Bath and solicitor to a group of government departments, much preferred a Saturday evening of obligatory theoretical sparring to the normal duties of polishing boots, cleaning windows, blanco-ing belts, scrubbing the floor, and other such chores.

The details have faded, but the antithesis between science and religion was central. Memory returned recently when I took part in the 1980 Science and Religion Forum at Manchester. I was stirred also by memories of a different kind and time on meeting Sir John Eccles as fellow-speaker, now in his boisterous seventies.

As one small post-graduate dot in a vast crowd, I attended in 1952 the great neurophysiologist's Waynflete Lectures at Oxford. He interwove profound factual analysis of the brain with dualistic mystification (so we felt) concerning the mind. At his last lecture an extra slide was unaccountably projected on to the screen. Before our eyes hung a brilliantly executed pen-and-ink drawing of Sir John and assistants struggling with a recalcitrant Ghost in the attempt to re-insert it into the Machine. Some impudent unbeliever had tampered with his slide sequence.

I asked him if this still summarised his position on the mind-brain problem. "You could say today" he answered "that man's brain is the computer, man's mind is the programmer. A person cannot choose the particular computer God gives him. He must simply do his best with it."

My brief at the forum was not to philosophise, but to give an account of the current state of development of artificial intelligence and its applications. I arranged my presentation so as to emphasise that the ultra-clever machines of mainstream computing are a great deal more threatening to human autonomy than the humanly responsive creations of AI.

Problems of morality surfaced in a later panel discussion moderated by the Bishop of Durham. For example, once robots have been developed to a sufficient level of intelligence for the question to make sense, should people feel free to mistreat them? My proposal, generally supported, was that the decision can be soundly based on moral grounds quite independent of speculations about consciousness. We can decide that it is wrong to make a sport of teasing cats, without first having to settle such questions as whether a cat is conscious, or has a soul.

The matter will become further complicated at such future time as an expert system can capture the specialist skills of a world expert in such faithful detail that, although he may now be dead, colleagues and friends interacting with the system recognise his personal style of thought and respond to the foibles and fancies of the thrilling intellectual companion whom they knew. To wipe out such a system irretrievably, rather than archiving it, was unanimously felt to be reprehensible. One participant likened it to the burning of the great library of Alexandria, attributed to Julius Caesar. Perhaps, though, the desecration would run even deeper than this image suggests.

Perpetuated fragments of responsive behaviour surely have a claim to sanctuary deeper in nature than the claims which can be advanced for books, photographs, tape-recordings and other passive relics.

It was over the phenomenon of computer induction that philosophical feeling was truly aroused. For those who find computing technology disturbing, comfort is derived from a slogan that goes "You only get out what you put in!", and even more comfort from another, which goes "A computer can never be creative!" As best I could, I deflected the stream of collective anxiety to the point where it properly belongs, namely to the nature of the new computational structures created by computer induction. Are they to be black boxes . . . white boxes . . . grey boxes?

This is the issue to which social concern, and ultimately legislation, will need to be directed.

Donald Michie

Professor Donald Michie is head of the Machine Intelligence Research Unit at Edinburgh University.

TEN YEARS AGO...

● From Computer Weekly of June 25, 1970 . . . .

WORK on a new 125-acre headquarters site at Cosham, Portsmouth, for IBM is to start before the end of the year . . . The first Honeywell 4200 to be installed in Europe is now operational at the New Southgate computer centre of Standard Telephones and Cables in London . . . Talks have begun between ICL and CII on a new European computer rapprochement . . . A team of 40 software specialists has left IBM France to form an independent software house, to be called Computer Service . . . One of the latest newcomers to the European computing scene is SE Laboratories of Florida, which has opened a Paris office.

Fax to Canada in just over a minute by satellite

THE first link in what could become a major international public facsimile service was launched last week between London and Toronto. Operated by the Postal Business side of the Post Office and the Canadian postal authority under the name Intelpost, the link is by satellite between selected post offices in the two cities.

Inaugurating the service Ron Dearing, chairman-designate of Postal Business, said the UK saw this as the first step in an international network; but the US Federal Communications Commission has rejected proposals for Intelpost put forward by the US Post Office and RCA Global Communications.

The original plan was for Intelpost to come into operation last year with links from the US to the UK, France, West Germany, Holland, Belgium and Argentina. Iran was also among the countries that had indicated an interest in the service.

However, the FCC rejected tariff proposals put up by RCA, and another major telecomms company, Western Union International, protested to the Commission that RCA pricing for Intelpost undercut the already established RCA Q-fax service. This service operates between RCA bureaux in the US and PTT offices in about a dozen countries including Japan, Hong Kong, Australia and Switzerland.

The tariff suggested by RCA for Intelpost, which it said did not differ greatly technologically from Q-fax, was 60 cents a page with a minimum volume requirement. The Q-fax rate is between $6 and $12 a page. RCA has made no comment on the FCC objections.

Meanwhile the London-Toronto satellite link is costing £4 for the first sheet plus £2 for subsequent sheets of the same message. Each A4 sheet takes about a minute to transmit. If the message is collected by express post it costs a further £2 and another £1 for optional special delivery in Toronto.

To give the service a starting boost there is a half price offer for the first three months. Door to door delivery takes from three to seven hours during the normal working day.

An urgent document is fed into a scanning machine at the Royal Mail's Intelpost Centre at the Stock Exchange Post Office in London. The facsimile will be in Canada in just over a minute.

High speed Z8000

A HIGH-SPEED version of its Z8000 16-bit microprocessor has been announced by Zilog, and it intends to extend the power of the chip further by adding linked specialised processors in the future.

The new version of the Z8000 runs at 6 MHz — 167 nanoseconds — and is offered in two packages, the Z8001A which has 48 pins and can address up to eight megabytes of main memory, and the Z8002A in a 40-pin package addressing 64K-bytes.

The Z8000 features an architecture which enables additional specialised processors to be linked to it. Zilog is looking at a number of add-on products such as a fast Cobol processor and an array processor.

Rules say Cluff will have to stand again!

BY a constitutional quirk, the Institute of Data Processing Management's full-time secretary general Ted Cluff will have to stand for election again at the Institute's 1980 annual meeting.

It is being held at the Bloomsbury Centre Hotel, Coram Street, WC1 on Thursday, July 17 at 8.30 am and, in addition to Cluff's position, five members of the Institute's ruling council stand down. Nominations for all posts close on Tuesday, July 15 at 5 pm.

Cluff, who signed a seven-year contract with the Institute will have to go through the ballot box next year as well because it is now too late to change the rules for the 1980 meeting.

The meeting will be asked to endorse increases in membership fees of from £9 to £15 for an associate and from £12.50 to £21 for a full member.

The membership total currently stands at 6,500 and it is expected to pass the 10,000 mark in early 1982. Currently, about one third of all the applications are either coming from or are being sponsored by BCS members.

IBM aims for more WP sales

● From front page

over time support for facilities for filing and transmitting documents between all the word processing products included in the announcement.

It is forecast that by 1990 a substantial part of IBM's revenues will come from OEM peripherals sold to all comers (CW, June 12), and the company has take its first steps in this direction with the European launch of its 3101 Teletype-compatible display and the associated 3102 thermal printer.

The products are being sold in the UK through IBM's new direct marketing centre in Chiswick. The 3101 is an Ascii display with separate keyboard, attachable to IBM and other manufacturers' computers and running at speeds between 110 and 9,600 bps. The printer is a thermal matrix printer running at up to 40 cps.

FOCUS

Motivation for DPMs

IN a period when improved DP productivity is high on every installation agenda, motivation of both personnel and management is becoming an ever more important factor. Motivation can take many forms ranging from direct encouragement to dire threats, with a little general pleading and cajoling thrown in for good measure.

In the States, however, there is no room for such subtleties. The latest salary survey reveals that in the land of The Big Apple, the DPM is taking a substantial bite, the average DPM's salary in 1979 being $27,000. The front runners in the US pay stakes are public utilities and finance, which probably reflect similarly in the UK. Obviously, therefore, UK DPMs seeking [illegible] incentives would be advised to either move into government service or to emigrate. If such a prospect does not turn on the average UK DPM, alternatives are not far away.

According to Ted Cluff of the Institute of Data Processing Management, a definitive motivation list for DPMs would include job satisfaction, bonuses, consultative management, working conditions, salary and prospects.

Not all of us would agree with this selection and many would be prepared to [illegible] working conditions provided the job itself had adequate compensations.

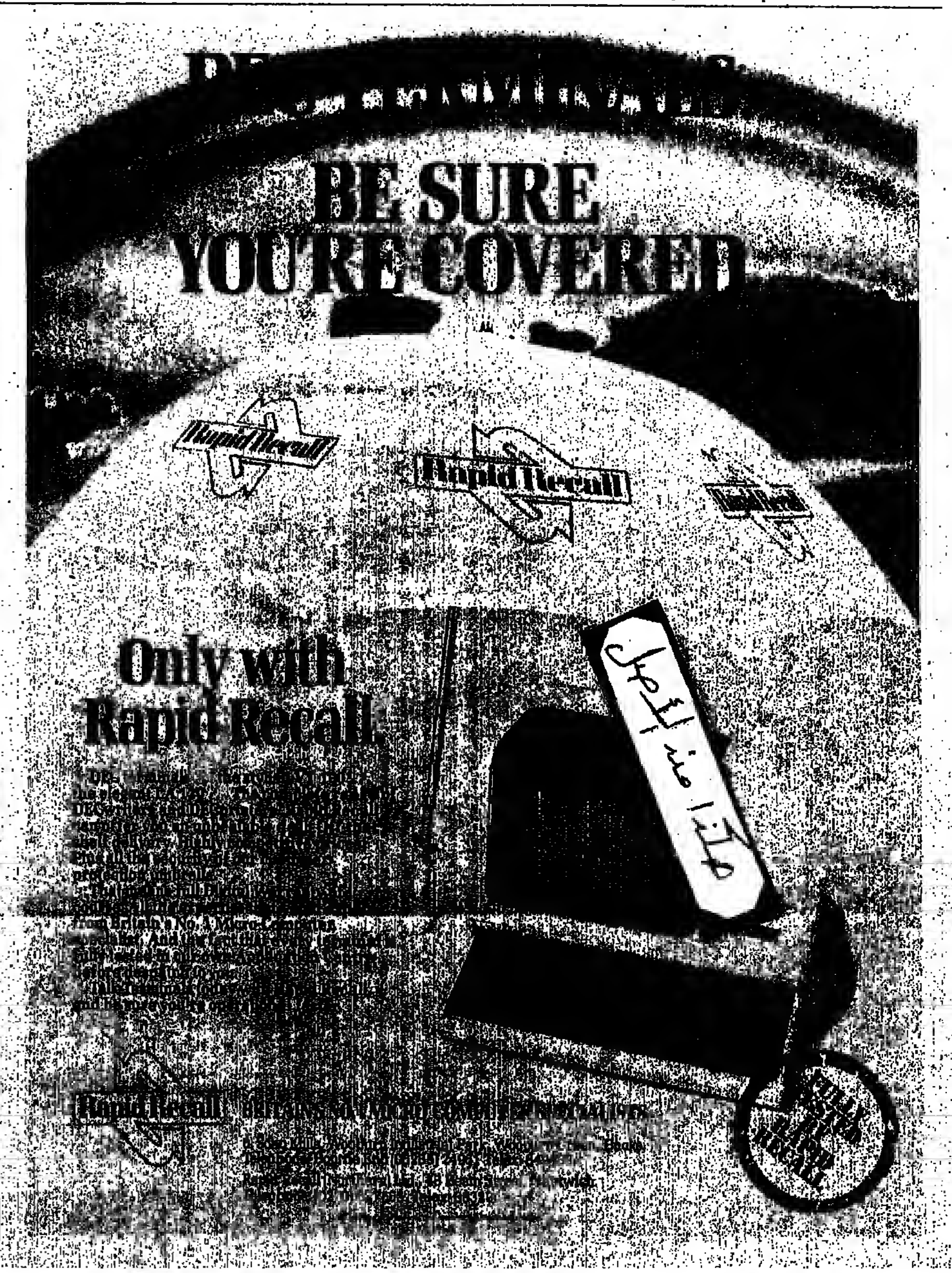
The prospect category, meanwhile, offers all things to all DP men. For many it suggests the prospect of the early introduction of high-level computing technology — for others, early retirement.

Having received the motivation message, it is the turn of the DPM to encourage his team. Where cash is tight and hours are long, the introduction of a portable radio in the ops rest room, a covered motorcycle shed in the car park or a poster of Bo Derek could well improve morale and hopefully productivity.

For the installation as a whole, winning fame and prestige could possibly work wonders. Winning the Computerstars competition could be just the thing. The running event should appeal in particular to the DPM [illegible] spending much of his time charging about in all directions. This event is not recommended for system analysts who specialise in running round in ever smaller circles.

The throwing event is very much for the programming team who are capable of throwing the complete installation into total confusion. In their case, a contest featuring loops would be appropriate.

Motivating the DPM to take part will of course be the major challenge. [illegible] might well be limited to scheduling training periods. Future aptitude tests could well include a dozen press-ups followed by half an hour's jogging.



PAGE SIX for programmers and analysts

Dispelling the myth of the 'backward North'

YOU can find anything you want in London, so they say, and indeed it does seem that, in order to look at most aspects of the computer world, you don't have to stir very far from the metropolis.

As many companies have their head offices in London, it is not only interesting but a refreshing change to find one which is based in the heart of North-West England with the London office only a sub-branch.

Ask anybody what they think of Liverpool and they will probably say that it is dirty, grimy and wet but the people are marvellous. Marvellous people are few and far between and the notion that most of them are collected in Liverpool is a bit hard to swallow. However, if you travel North there is a striking difference in character and attitude, which does not, however, make business there any less fruitful.

KBS Computer Services is a 10-year-old private company which is just about to become a limited company. Its head office is an impressive Victorian building in Liverpool's Dole Street. Bowers of Kennedy, Bowers and Smith, the original KBS, is now the sole proprietor of the company which is engaged in running commercial and TOPS courses, contract work and a data prep bureau. It is also OEM dealer for the Texas Instruments DS990I0.

The company first started running TOPS courses in 1975 when it was approached by the Manpower Services Commission and asked to use the training expertise it had cultivated in holding commercial courses, something Bowers had entered after finding an appalling lack of knowledge in the industry.

An IBM 4331 has recently been installed at the Liverpool office and the firm hopes to set up a bureau there. KBS has offices in London, Coventry, Leeds and Birmingham. The Coventry office has an ICL 2903 and also runs a recruitment agency.

The wide spectrum of activity covered by KBS does not impair its success in any one venture, but surprisingly the company does not make a very big profit.

"Bowers, the proprietor, is not the sort of man to focus all his attention on money-making," explained Andy Feather, advertising and promotion manager for KBS. "Most of the money we make is ploughed back into facilities for the students."

The students at Liverpool that we spoke to confirmed the fact that they are very well treated and are getting the most out of their training.

Also, it was reassuring to see that on the day we visited KBS, a special open day was being held for representatives of the Manpower Services Commission and Job Centre workers.

We have written before on this page about complaints from prospective students and employers that Job Centres do not have adequate information to give to those who wish to pursue a career in computing. On this particular day in Liverpool, people from the MSC were treated to a film show and introduction to computers, an explanation of KBS TOPS courses, selection procedure and methods of training and were then given the aptitude tests themselves to attempt.

TOPS students at work on the North Star Horizon microcomputer.

This part of the open day caused not only great hilarity as those present realised their unsuitability to the job of a programmer, but great insight into the sort of people who could find success in computing.

The attitude and application of KBS TOPS students was impressive. In recent examinations of TOPS courses we have always found an odd and interesting mixture of backgrounds, and Liverpool proved to be no exception.

A barman, a croupier, a used-car salesman, a teacher and an electrician were among the ones we interviewed, and even a former trainee priest has passed through the doors of KBS to programming success.

Both the ex-croupier and the ex-salesman said that they had to take considerable cuts in salary to go on the course, and that their starting salary on starting work would also be a great deal less than they were coming out with before. They also said that they had to put in quite a few hours, working most nights until nine or later, coming in at weekends and generally losing out on social life.

But there were no complaints. "You don't get many chances in life," said one student ominously. "We're very lucky to get this one and if we mess it up we don't get another."

KBS TOPS students are carefully selected not only on the grounds of their success in the aptitude tests but on their general employability. As one MSC official pointed out, "There's a world of difference between training and placing."

One student had a job waiting for him on completion of his training, in Norfolk, where he was moving with his wife of only a few weeks. Students can state the areas in which they would prefer to live and work and the placement department, which arranges interviews and jobs nationwide, tries to adhere to their choice.

KBS teaches PL/1, Cobol and Assembler on its programming courses, but as the courses are arranged so that people are trained in the correct ratio for vacancies, most do Cobol.

The students had all enjoyed the course and although not confident of complete success were sure that they would start their new jobs — two weeks before the end of course all students had jobs to go to — and be useful from day one. One student said that he thought the training and depth of knowledge he had acquired was equivalent to 18 months' commercial experience.

No-one is going to suggest that all firms in the North-West operate in the same way as KBS in similar headquarters or with the same altruistic principles. Neither could they say the companies in the area are less successful, less business-like or in any way behind those in the South.

However, myths still do exist about the "backward" North and it is encouraging to find a firm of the size and diversity of KBS which is rapidly turning out highly qualified local people into the computer industry throughout the country.

Puzzler

AS part of his homework recently, my youngest son had to work out 157⁵. The answer ran to eleven digits, and what with his trying to squeeze it all on to the same line of his exercise book, the last figure came out so small that I couldn't read it.

So his (correct) solution looked something like this:

95,388,992…

However, I had very little difficulty in deciding what the final digit was supposed to be without the aid of a calculator.

Would *you* like to hazard a guess, before turning to page 33 for the solution?

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SOFTWARE FILE

by Claire Gooding

Green light for Ada production compiler

THE multi-million dollar contract for the first Ada compiler has gone to Softech of Massachusetts. The US Army communications research and development command, Caradcom, of New Jersey, has commissioned the company to build the first production compiler for the long-awaited high level language under the management of Dr Larry Weissman.

Honeywell, which teamed up with Softech in writing the winning proposal, is to assist in the compiler design and building as a subcontractor. Honeywell's French associate, CII-Honeywell Bull, will act as consultants on the language.

The Ada language is considered the next generation standard language for Department of Defence activities, and the contract is a milestone in its evolution. It will result in a compiler hosted on the Digital Equipment Vax 11/70 and PDP 11/70, and the US military computer AN/GYK I2.

Softech specialises in the definition, analysis, design and implementation of computer-based systems for government, commerce and industry.

In the UK, preparations for the Ada revolution are being made by the Ada consortium, in which three otherwise rival companies have pooled their resources.

Representatives from SPL, Software Sciences, and Systems Designers have formed a single team of Ada expertise so that the UK may keep abreast of the vast market shortly to be generated by Ada. The consortium's main concern is that the UK should have tools based on the home market to complete against US and European products.

A consortium spokesman welcomed the compiler contract as a sign that Ada is alive and kicking. "It reinforces our view that the prospects for Ada are good. But it is likely that the coming US Air Force compiler will be beat as a possible future standard and it is unfortunate that the US Army has chosen to go its own way."

International standard

MEMBERS of the Ada consortium — SPL, Software Sciences and SDL — believe that Ada technology will be the key to the defence and industrial systems markets of the future and, with the backing of the Pentagon, it is likely to become the standard real time language for defence from the mid 1980s. Whereas Coral was a UK standard, Ada is designed to be an international one.

APL meeting

APL language originator Ken Iverson is to speak with Gene McDonnell on "Teaching and APL" at an open meeting at the Cafe Royal, Regent Street, London, on Tuesday, July 1.

It opens at 5.30 for 6.00 pm and admission is free.

User group

A USER group for the MVT/Famos operating system has been formed by Equinox Computer Systems of London. MVT/Famos is a multi-tasking, multi-user disc operating system which runs on most 8080 and Z80 microsystems.

Equinox has also announced that CAP's MicroCobol is now available on the Equinox microcomputer system, including the range of applications such as AutoClerk and AutoIndex.

Marketing deal

THE online programming system Acep, previously sold by Itel under the name Prepso, is to be marketed and supported by Software Module Marketing of Sacramento, California.

Acep interfaces directly with CICS/VS, and also with remote BTAM, TCAM and VTAM as well as local 3270s. IBM's VS1 and MVS operating systems are also supported.

Pacs goes online

PACTEL has announced an integrated online version of Pacs, the inventory and control system, to run on ICL ME29/2903 series.

100 firms at first Euro show

WHAT is claimed to be the first European show to be devoted entirely to software is to be held in Paris next May. Run by a UK company, Executive Conference Organisers, it will be a three-day event in English and French and will include an exhibition. About 100 firms are expected to take part.

The plan is to provide each exhibitor with a terminal with access to remote machines in order to demonstrate products.

Details from Robert Joseph, Acorn Studios, 9A Byfeld Gardens, Barnes, London, SW13 9HP. Tel: 01-748 0287.

OS version

AN OS version of the job accounting and billing system from Computer Associates, CA-Jasper, has been released. It provides the report generator Wizard as part of its facilities and is compatible with the DOS version. It costs £5,500 from CA in Maidenhead, Berks.

Two challenge 2900 transaction market

TWO developments independent of ICL are likely to liven up the ICL 2900 transaction processing market. A newly-formed consultancy offering a complete transaction processing service for 2900s has arrived on the scene at the same time as Vecoms-TP2000, an online applications control system for 2000s running under VME/B, from Gresham Computer Services.

Consultancy Terney, Edge and Morffew (Team) is said to have broad experience in the development of 2900 software, TP services and VME enhancement. Its services include TP design and implementation, project management and transition to 2900 TP under VME, and advice on sizing and performance as well as answering day-by-day problems.

Gresham's aim with the Vecoms-TP2900 was to build on the TP skeleton provided by ICL to create a total online environment for the implementation of TP on the 2900, as well as providing a simple method of transition to ICL native mode of operation for users of other TP systems.

The areas where Gresham has concentrated effort in improving on ICL's standard teleprocessing option, TPO, and teleprocessing message systems TPMS are privacy control, message handling, security application control, and the provision of online performance data.

The system, which was developed using Cobol in 13 man-years, boasts an average response time of two seconds on nine terminals. It was developed with ICL's approval, and is already running at one site.

Vecoms-TP2900 costs £18,000, with £150 a year maintenance after the first year. A VME/K version is planned.

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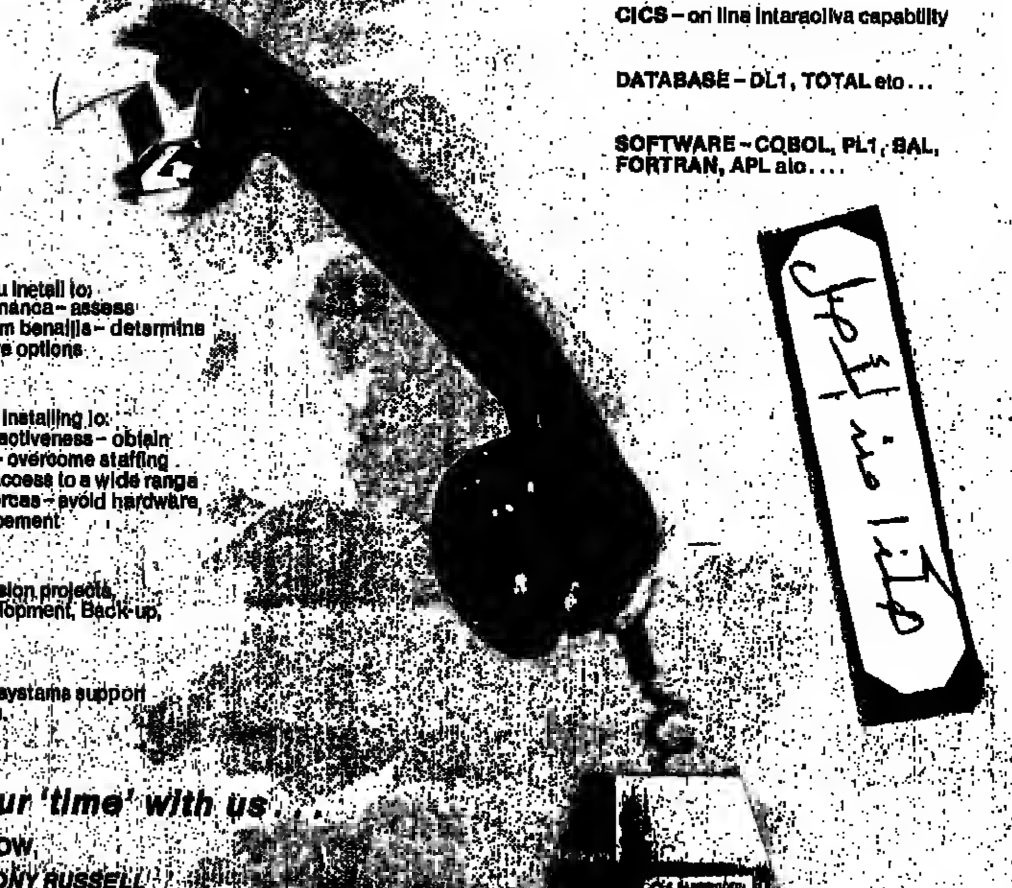
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OP SPOT by Bernard Allen

IBM rules OK on the operator training scene

MANY an installation is willing to spend large sums on the latest in technology, but resorts to penny-pinching where operator training is concerned.

The latest in hardware and software is snapped up almost regardless of cost, much to the delight of management and development staff alike.

But the operators — the people responsible for the equipment, day in, day out — often receive very little in the way of formal training. They're expected to acquire their skills as they go along. Odd sense of values, don't you think?

For he il from me to dismiss informal, hands-on training — it enables staff to learn the practical side of their work.

However, it is my view that such training is rather limited and must therefore be supplemented by formal courses.

It was for this reason that BOC Dataselve's operatnr training centre in Old Park Lane was featured on this page some weeks ago (Op Spot, April 17).

Lest people think that Op Spot is biased in favour of BOC Dataselve, let's look at a few other companies and the operator training courses they provide.

I'm afrnid it's rather n case of "IBM Rules OK", as the companies we contncted dnn't provide anything for ICL or operators of other manufacturers' equipment.

Infotech Operutinns runs a wide runge of courses including those relatiog to the IBM OS operating systems, DOS, DOS/VS, DOS/VSE, data control techniques and telecommunications. The basic teleprocessing course is IBM-biased and is intended primarily for sites which are about to implement a teleprocesing system.

The company also runs an advanced teleprocessing course intended for experienced operators and TP controllers. Both courses are IBM-biased and are held in London on a three-day residential basis. The fee is £345, plus hotel expanses.

Peter Young, manager of forums snd courses at Infotech, told me: "The advanced TP coursc examines data communications and its practical applicntions in real time and teleprocessing systems. it goes into fault diagnosis, reporting and recovery techniques."

Now, some managers contend that they can't let their operators go on courses because they don't have sufficient cover.

Well, if you're an operator at a site with IBM kit and you have come up against that sort of excuse, why not tell your mnnager about the video courses available from Deltak, a part of the Business Intelligence Services Group.

The beauty of the Deltak cnurses is that they can be followed on-site during the day, evening or night shift.

All your manager has to do is buy the vidao equipment (Deltak will give him expert advica on this) and rent or buy the appropriate courses.

Courses of interest include 370 architecture, the IBM OS operating systems, DOS and DOS/VS. A DOS/VSE course will be available soon.

If it's operations supervision and management courses you're after, why not try Hoskyns Education, who are based at 91-93 Farringdon Road in London. Tel: 01-242 1851.

Hoskyns Education's weeklong operations supervision course costs £245 per person.

It covers such matters as decision-making, staff appraisals, staff training, and verbal and written communication.

Infotech's address is: Nicholson House, High Street, Maidenhead, Berks. Tel: 0628 35031. And Deltak's: Deltak Ltd, Banda House, Cambridge Grove, Hammersmith, London W6. Tel: 01-741 4711.

Op Spot is your forum

NOW that we're back in business it would be good to hear your comments on all sorts of matters relating to the world of computer operations. Op Spot is the only place in the computer trade Press where operations staff can put forward their views, ideas and complaints. It's a forum intended for you — why not make use of it?

Can you take TOPS students?

HOW about taking a TOPS operations student for two weeks' practical training at your installation? Berkhamwood College is looking to place such students from July 7.

This part of the TOPS operations course provides an excellent opportunity for installations looking to recruit operations staff at the junior level.

The students hope to find sites near their respective home towns. They hail from the following areas: Stevenage (2), St Albans, Norwich, Hove, Luton (2), Wood Green, Northants, Watford, Hitchin and Sandy in Beds.

For further information, contact Derek Pinnock who is TOPS operations lecturer at Berkhamwood College. He is available on 01-953 9024.

Manual v automatic scheduling for the data centre manager

THE typical installation copes with a wide range of problems, catering for the needs of many types of user.

Thus we have the wide use of online and real time syatems, as well as batch, with hardware being placed in the hands of users.

Consequently, decisions on which user gets priority are much more complex making some kind of scheduling syatem necessary, according to a portfolio from Auerbach.

Called Daveloping a Data Centra Scheduling System: Overview, it is one of the latest additions to Data Centre Operations Managemant* and discusses the merits of both manual and automatic scheduling systems.

The author explains how a scheduling syatem helps the manager deal with such matters as unhappy users, user misperception, and oquipmant under- and over-utilisation.

On usera, he says! "The DCOM (data centro operatinns manager) may nctually be apologising for a problem caused by the uscr. A gnod scheduling system enables the DCOM to compare planned events with actual events and improve job flow."

Regarding equipment under-utilisation, he comments: "Scheduling cannot completely overcome the affects of a poorly configured system or improve poor operator performance. However, an effective schaduling system can help the DCOM deal more effectively with these problems by enabling him to identify the real cause of the problem."

The author points out that proper scheduling can improve the utilisation of any critical resource and touches upon the following areas:

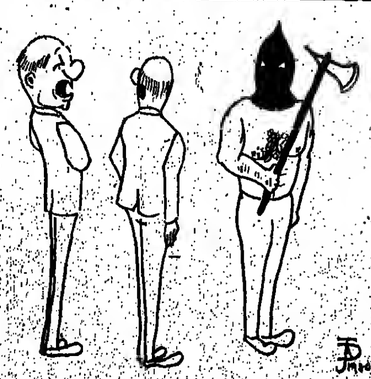
● Input control. Data input almost always affects the schedule. The input clerk should know not only when the input is to arrive, but also when it is due in data entry, the next function to be performed.

● Data entry. Data entry should be aware of the number of documents, their time of arrival, and when the input is due on the machine.

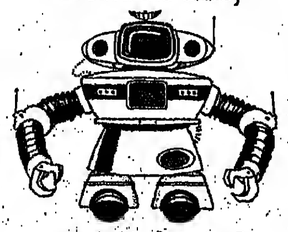
● Data control. It is up to the scheduler to let data control know when the job is due on and off the machine. Sufficient time should be allowed for job set-up, JCL preparation and checking output.

As to the machine itself, he says that block scheduling, where certain resources are dedicated to a given function for a certain time, is the simplest and most widely used form of scheduling.

*Data Canire Operations Management. £120 including bi-monthly updates. Distributed in the UK by Computer Aid for Management, 168 Grent Portland Street, London W1. Tel: 01-637 0066.



The day computer operators look like this,



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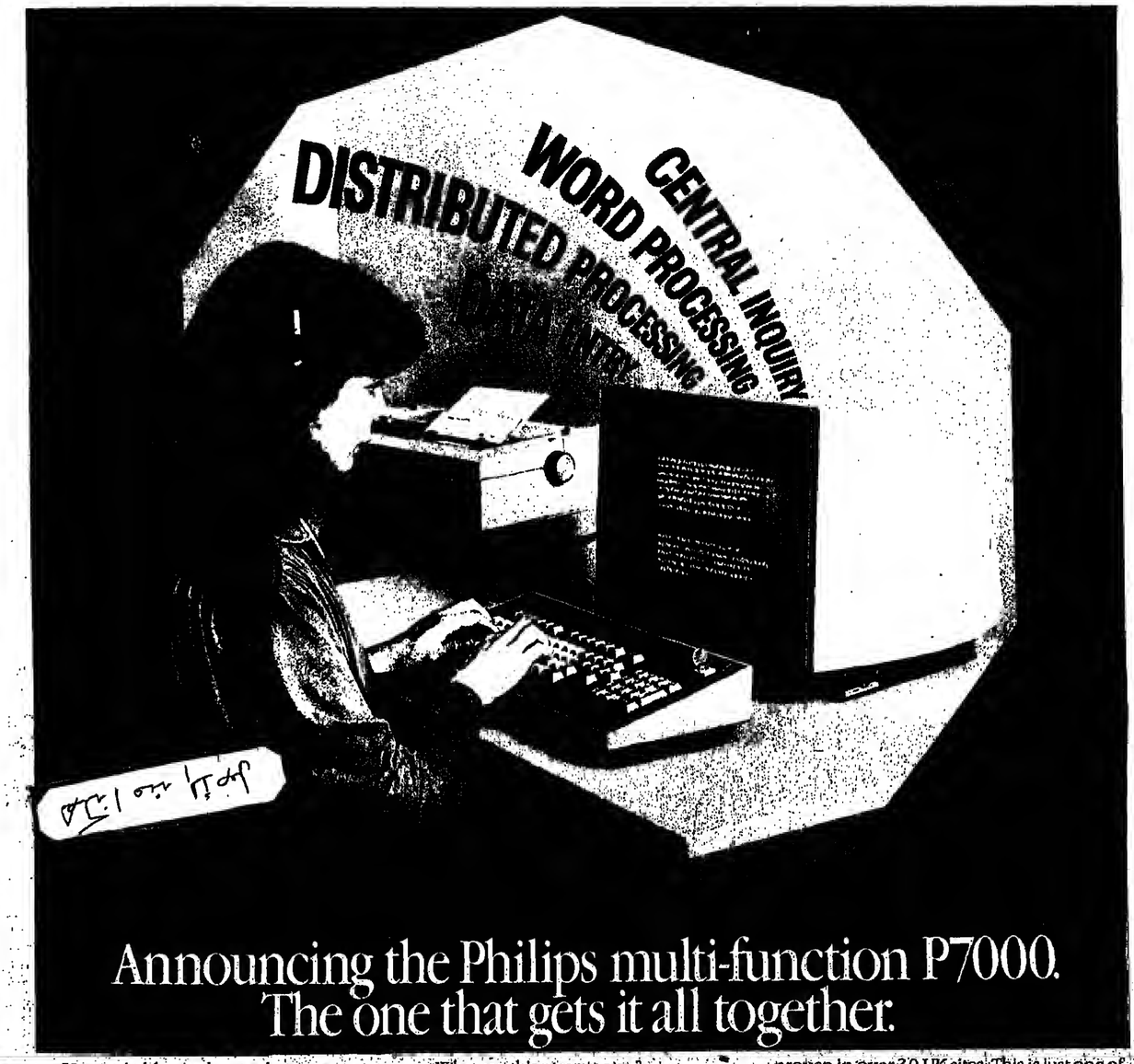

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Optimum flexibility because computer resources keep up with changing demands – hour to hour, shift to shift, month to month; one minute word processing – the next; taking orders and printing out invoices.

Planned growth because additional terminals, memory extension modules and peripherals can be added step by step.

What's more, the P7000 is installed and proven in over 30 UK sites. This is just one of a dynamic range of office machines – and all part of the wider Philips Business Systems' contribution to a whole new world of business knowledge.

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PEOPLE and EVENTS

CAN you spot Scan Computers' sales director in this picture? The clue is the tiny letter R on the cuff, and the man is Neal Atkins, who is also a lieutenant-commander in the Royal Naval Reserve. Atkins received the Royal Navy's Reserve Decoration from Rear-Admiral Williams, Flag Officer Medway. The Decoration is presented for long service and good conduct: Atkins has been a serving Reserve officer for 14 years.

Selling Scotland in Silicon Valley

THE City of Glasgow is to be promoted in the US by a newly-appointed Business Development Executive, Edward Brodie. His brief is to sell Glasgow as a trade and investment centre to companies seeking to expand their operations or link up with Scottish companies.

Brodie will be based in California for one year, during which he will make contacts in the business community, promote Glasgow and the West of Scotland as a base for industrial expansion and identify outlets for Scottish products and know-how in the US.

Later, he may move on to other parts of the US, Japan or Europe.

Brodie is also deputy chairman of Insight Business Systems and managing director of the Black and Edgington Group's computer division.

Brodie

Kevin Kelly has been appointed general manager of Pensions and Insurance Computer Services, the division of UCSL in which he was a partner before its acquisition by UCSL in 1978.

Kon Mace has become sales manager computer systems with ITT, and Peter Harbour is product sales manager, viewdata systems.

Roland DeSilva has been made director of international operations with Auerbach Publishers. Until recently he was a publisher with Chilton International.

Brian Arnott has joined Century Data Systems Inc in the newly created position of director of European marketing. He will be based in Bracknell, Berks.

OBITUARY

Sir Vincent de Ferranti

SIR Vincent de Ferranti has died at the age of 87. He became chairman and managing director of Ferranti Ltd in 1930 after the death of his father. The atmosphere which was created under his leadership was very favourable to research and led to the company's major contribution in the electronics field.

It was owing to his encouragement that Ferranti's pioneering work on the digital computer was undertaken, in collaboration with Manchester University.

Sir Vincent remained as managing director of Ferranti until 1958, and as chairman until his retirement in 1963.

Engineering prize deadline approaches

A £500 PRIZE is awarded annually for a practical contribution to the advancement of electrical or electronic science or engineering. It is the Karl Heinrich Gyr and Heinrich Landis Commemorative Prize, and is administered by the Council of the IEE on behalf of the donors, Landis and Gyr Ltd.

The prize went last year to Dr T. G. Blaney for his work on the application of the Josephson Junction to research into high frequency microwave and laser systems.

The deadline for applications is next week, June 30. Forms and further information about the award can be had from the Secretary, The Institution of Electrical Engineers, Savoy Place, London WC2R 0BL.

NRDC chief

DR JAMES CAIN has been appointed managing director of the National Research Development Corp, succeeding W. Makinson, who retired at the end of May.

Dr Cain has a PhD in chemistry and worked as a research biochemist before joining NRDC in 1955. He has been chief executive of NRDC's department of applied science since 1971, and a member of the corporation since 1973.

Greenwood Scott

Mike Greenwood has joined Data Logic as training and development manager. Previously he was training manager for Spillers-French Milling. Chris Scott, previously rack and stack manager with Cossor, joins Data Logic as Southern region manager for the customer engineering division.

Stewart Smith has joined CAP Scientific as manager of the CI group, from Plessey.

Plessey Semis MD appointed

PLESSEY Semiconductors has a new managing director, Douglas Dunn, who has joined Plessey from Motorola UK, where he was deputy general manager of the East Kilbride operation.

Dunn will be based at Swindon, Wilts and will report to Melvyn Larkin, managing director of the solid state division.

Chairman of CEI

CHAIRMAN of the Council of Engineering Institutions for 1980/81 is Dr Percy Allaway, chairman of EMI Electronics and a past president of IERE.

Elected vice-chairman is Bryan Hildrew, managing director of Lloyd's Register and senior vice-president of the Institution of Mechanical Engineers.

Jim O'Hagan has been appointed director and general manager of Datecall, and David Sheppard has been promoted to bureau manager, with the responsibility of marketing technical packages for the engineering and chemical industries.

James Stark has been appointed a director of Y-Ard, the engineering consultants. His previous appointment was that of manager responsible for control systems, simulation and microprocessor applications.

Manfred Omenzetter, previously European distributor manager of Rockwell's electronic devices division in Munich, has become sales manager for Central and Southern Europe with the division. Leonard Sim has joined the division, as sales manager, from Ferranti Semiconductor.

Liveware File

by Dex

DIARY

JUNE 26-27
Meeting. IBM CUA operations group. Unicorn Hotel, Bristol.

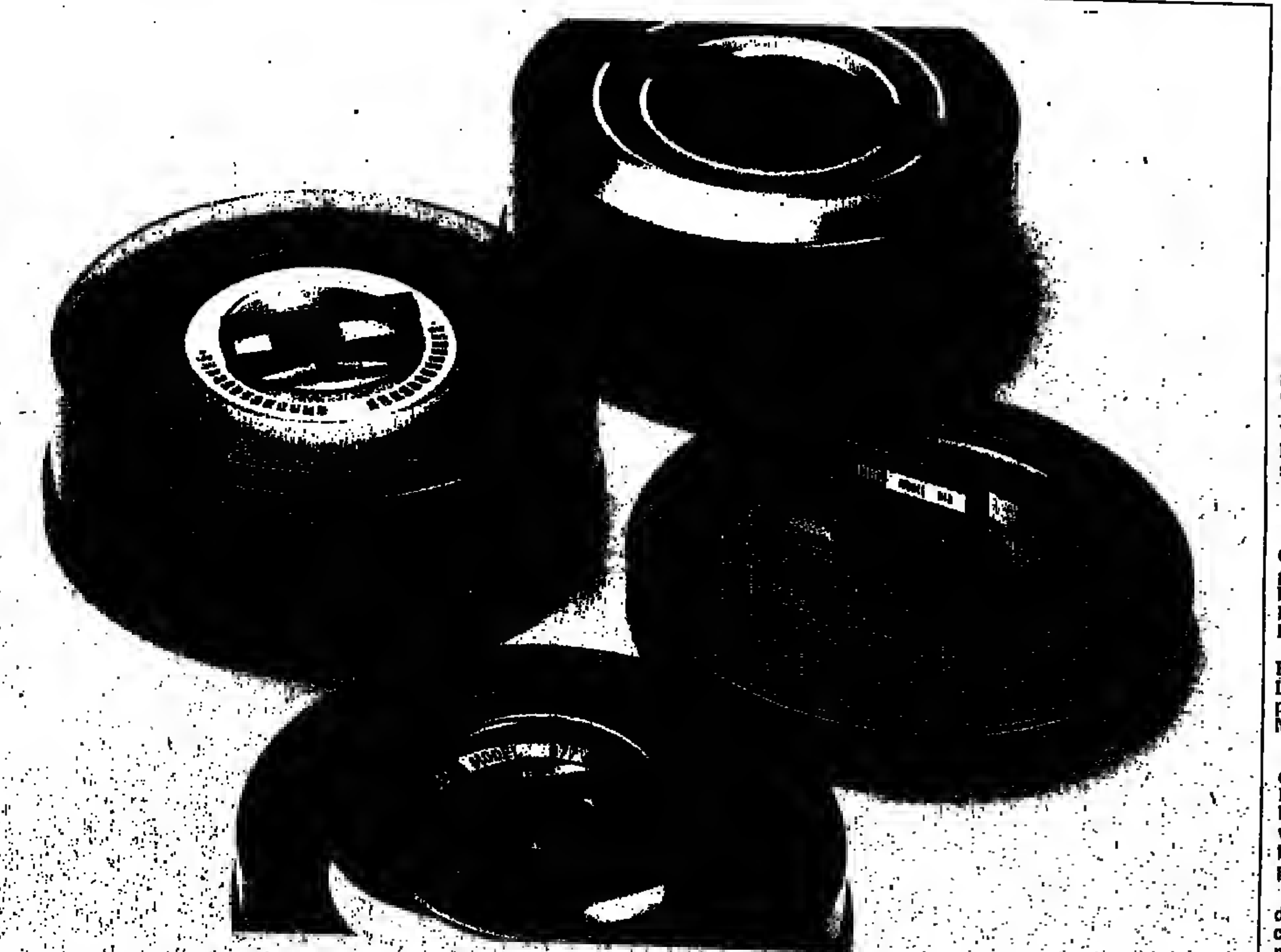
JUNE 27
Applications of microcomputers in civil engineering, conference and exhibition. The City University, Dept. of Civil Engineering, City University, London, E.15. Details: Mrs Linda Gilroy, 01-253 4399 ext 210.

JUNE 30
Floating point systems users' group AGM. University of Surrey, Guildford. 6.30. Details: David Bish, 0483 71281 ext 470.

JULY 2
Integer programming approach to crew scheduling. BCS Mathematical Programming Study Group. London School of Economics, London. 6.30.

JULY 3
IBM Guide SET group meeting. IBM, Basinghall Street, London EC2. Details: Alan Peck, 01-628 2104.

JULY 3-6
Lawyers in the Eighties, conference and exhibition. Society for Computers and Law. University of York.



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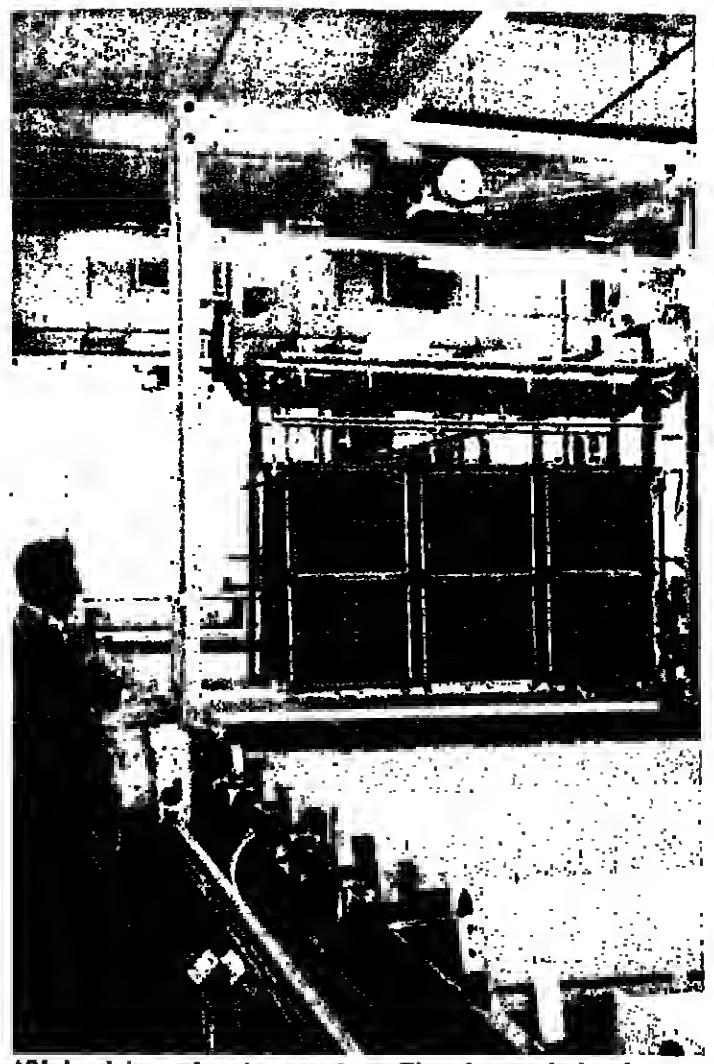
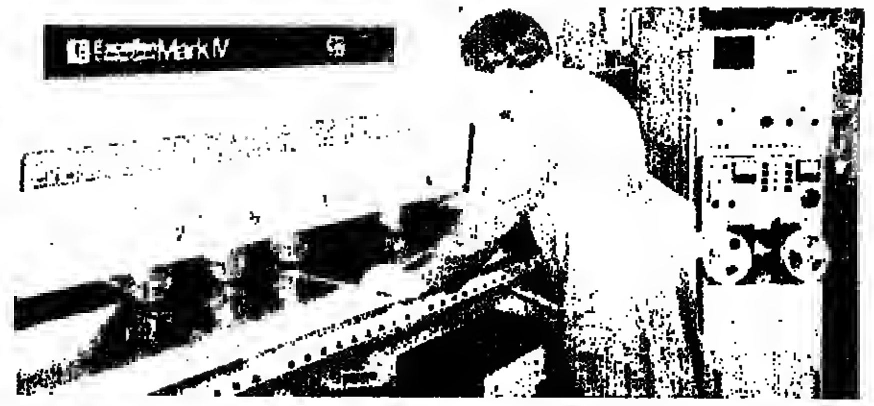


ICL Logiclayer has invested more than £500,000 in each of its two computer-controlled plating lines at Plymouth Grove, Manchester, and Kidsgrove, Staffs. Shown here is part of the section of the line at Plymouth Grove used to electroplate copper and tin-lead on to the circuit patterns on the outside surfaces of the multi-layer boards. It also plates the sides of the holes that vertically connect the different layers inside a board.

The electroplating is preceded by an electroless plating process which metallises the sides of the holes to a sufficient thickness for electroplating to become operable.

The inside layers are made up of copper clad epoxy glass laminates which are bonded together after the circuit pattern has been etched out of each copper layer using a photo-chemical process based on a photographic master of the circuit artwork.

When up to eight different layers of active circuit lines as narrow as six thousandths of an inch are contained in one printed circuit board the holes that vertically connect the layers must be positioned with great accuracy. To achieve this level of precision ICL Logiclayer uses program-controlled automatic drilling machines from the US firm Excellon of Torrance, California, which was considered to offer the most suitable equipment for the job. The Excellon machine in our picture (right) is one of six at the Plymouth Grove factory which together are capable of drilling several million holes a day.



System X a target market for Logiclayer

by Keith Jones

THE Post Office's massive investment in all-digital telephone exchanges for System X could provide a lot of business for the multi-layer printed circuit board manufacturing and marketing operation, ICL Logiclayer, that was formally launched by ICL last week (CW, June 19).

Logiclayer personnel have already had talks with the Post Office about the suitability of using its multi-layer boards in System X exchanges in the future. It appears that multi-layer technology satisfies the System X requirements for high reliability and fast repairability.

Logiclayer points out that its output of multi-layer boards is a lot higher than any of the three telecommunications firms under contract to build System X exchanges: GEC, Plessey, STC.

Telecommunications is one of several markets being targeted by Logiclayer. Avionics and military electronics in general are two other big potential outlets, and Logiclayer emphasises that it is also prepared to sell boards to ICL's competitors in the computer business.

But while it claims world leadership in multi-layer fine line PC board technology, Logiclayer does not appear to be geared up yet on the marketing side to make a killing outside Europe. In the US Logiclayer depends on ICL's small force of computer salesmen to make initial contacts with prospects in the electronics industry and there is no marketing set-up at all in Japan — a market with enormous potential. Logiclayer recognises the potential of Japan but has made no arrangements yet to sell there.

Indeed, Logiclayer expects two-thirds of its projected £5 million worth of business outside ICL in 1982 still to come from the UK even though by 1984, according to figures quoted by Logiclayer itself, the multi-layer board market in Europe alone will have grown to nearly £150 million.

Logiclayer's plan is to expand production by 20% a year over the next five years, and no more than about 25% of output during that period will go to outside customers. This growth can be achieved with the existing plant and machinery at the two existing and virtually identical fine line multi-layer manufacturing facilities at Plymouth Grove, Manchester, and Kidsgrove, Staffs. According to Logiclayer there are about a dozen other factories around Europe manufacturing multilayer boards at the moment. They belong to competitors like Marconi, Ferranti, Siemens and CII-Honeywell Bull.

But Logiclayer is confident that the service it can provide compares favourably with any competitor. The company points out that its highly productive equipment will reduce the time for getting a customer's custom designed board into production from nine months to three months and that the wait can be as little as six weeks using a special quick turnround facility.

Logiclayer claims to be the only PC board manufacturer that can produce boards with as many as 22 layers in large volumes while achieving economically high yield rates. The average proportion of boards that have to be totally scrapped in a week is only 2½%. About 150 boards with 22 layers are being produced per week at the moment. Each 22 layer board contains eight layers of active circuit lines and when used as a motherboard it is capable of supporting 30 daughterboards, each with a total of six or eight layers and nearly 150 integrated circuits.

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MICRO NEWS

Apple to use Eire as launch-pad

DURING Computer Weekly's enforced absence, US computer company Apple has made two decisive moves that could make its position in the personal computer market equal to that of Intel in the microelectronics market.

Firstly, it has moved its concentration with Apple II from the education market directly to the business market with the new Apple III.

Secondly, Apple is moving in a big way into Europe, with a plant at Cork, Eire, and a European marketing operation in Zeist, Holland.

Apple III is aimed directly at the $3-10,000 business computer market which, according to Dataquest, is growing much faster than the home computer market and is expected to reach $700 million by the end of 1981.

The system can be used in two main configurations, an information analyst and a word processor. Both can be Apple II look-alikes and directly run Apple II software.

For about £2,500 the information analyst package comprises an Apple III incorporating 96K-bytes of RAM, a built-in 5¼ inch floppy disc drive, which controls up to three additional discs, a 73 key keyboard with a 13 key numeric keypad, two built-in printer interfaces and a 12in black and white video monitor (a colour monitor or TV set is optional).

The software includes Apple's SOS (sophisticated operating system) which supports Pascal, Basic, Fortran and Pilot (educational language) and tools such as Visicalc III, Mail List Manager and Apple Business Basic.

As a word processor, Apple III comes with an external floppy disc drive as well as the built-in one to provide the capacity to store about 60 pages of text per floppy disc and costs about £4,000.

The Silentype thermal printer, or a letter quality daisy-wheel printer can be used. Software includes SOS and word processing applications software, and training is provided.

Like its predecessor, Apple III uses Mos Technology's 6502 processor, but in a later form. The 2MHz 6502A is twice as fast, has additional instructions and is capable of addressing 128K-bytes of memory. A 6-bit D/A converter is also built-in for use in voice and music synthesis. Apple is currently doing R&D in speech synthesis.

Microsense boosts its dealer network

AS PART of a plan to expand the number of Apple dealers in the world, UK distributor Microsense will be boosting its number from 200 to about 300.

But any new dealers must come up to a higher standard of support if they wish to gain Microsense's authority.

Users will be able to obtain the support service by paying an annual charge of £108 for an Apple II system. A similar scheme is envisaged for Apple III users.

For this fee, each dealer will supply a spare parts service for the user and return faulty parts to Microsense for repair.

Apple will be sending an Apple III to each dealer in July and volume deliveries are expected in August in the US and in October in Europe. It is likely that dealerships to office equipment suppliers will be granted and ITT, which produces Apple II under licence as the 2020, will not be given a licence for Apple III.

● Mike Brewer, managing director of Microsense, is planning to move sister firm Data Efficiency into an 18,000 sq ft building. The old one at Hemel Hempstead will be used as an Apple III store and for workshops.

1,400 more jobs for Irish

APPLE hopes to make a big impact in Europe and take 30% to 40% of the market. Initial plans are to occupy a 43,000 sq ft manufacturing plant at Cork, and, at the same time, to set up a distribution and support facility in Zeist, Holland. The factory should be running by September, firstly to assemble Apple IIs and then to manufacture both Apple systems and their respective peripherals.

This means 65 new jobs in Eire by winter, with about 1,400 by 1985, when the manufacturing area will have expanded to 360,000 sq ft.

Brum helps with IC and device problems

THE electrical and electronic engineering department of Birmingham University is to set up a service for industrial, commercial and government organisations to look at thermal problems in integrated circuits and specialist discrete devices such as microwave and VMOS power devices.

With a Wolfson Foundation award of £110,000, the department is planning to buy a new set of thermal imaging equipment to attain resolutions of 10 to 15 microns in its temperature and other measurements. Up to now it has been using equipment which can provide resolutions of 30 to 50 microns.

Two members of the research group concerned with this area, Dr P. W. Webb and Prof. G. T. Wright, see a major problem emerging soon in microelectronics fabrication. They define it as the placing of driving devices, such as power circuits which get hot, in close proximity to, but not necessarily on the same chip as, MSI, LSI and VLSI devices.

As the trend for more dense circuitry continues, so arises the need for tight-packing of devices with different thermal properties. This in turn creates reliability and temperature resistance problems.

A company that has designed and fabricated a circuit can use the facility to investigate its thermal profile and to detect certain characteristics, such as maximum temperature, over a period in different conditions. A reliability figure can be obtained with the results.

The department has offered a similar service for some time, primarily to investigate the market and the need for the service. Most of the work was done with discrete devices. It now recognises companies that may be interested in the service to be GEC, Smiths Industries, Texas Instruments and others.

US personal market shares

ACCORDING to a Dataquest survey, Apple has about 24% of the personal computer market in the US, Tandy has about 48% while the Commodore Pet has about 12%.

Although Tandy is top in terms of numbers, Apple claims to be top in terms of value of systems. However, in the UK, this is almost reversed: Commodore claims to be top with about 50% of the UK personal market.

Make your Pet sing

A COMBINED hardware/software package which is said to "make your Pet sing" is being offered by IJJ Design of Marlborough, Wilts. It is manufactured by Micro Technology Unlimited in the US.

FUTURE SYSTEMS FORUM

Royal Lancaster Hotel, London
10–11 July 1980

An international conference to analyse and forecast trends in information systems in the 1980s.

Online have arranged, in association with Advanced Computer Techniques Corporation, to present in London 'Future Systems Forum' which is a European update of a highly successful conference recently held in Phoenix Arizona.

It is an appraisal of likely future developments in large scale computing, communications and office automation. This will deal with forecasts of the probable characteristics and price structure of the IBM new range, including Series 'H'.

The conference brings together experts in both technology and financial analysis. It presents a unique opportunity to delegates for the exchange of information and views with some of the foremost authorities in this field.

Future Systems Forum in Phoenix received exceptional coverage in the computer press as the selection of quotations below indicate:

"IBM will eventually evolve into a 'gigantic service bureau' (Charles Lecht in the keynote address at Future Systems Forum." Computerworld

"At Future Systems Forum in Scottsdale, Fertig unveiled the most detailed projections yet" Electronics

"(Weil) contended the way to do it is to raise prices especially lease and rental—'I believe they'll do it again—and again'" Electronic News

"A major IBM Competitor noted that 'Bob Fertig is either very right or very wrong, and he is more often right'" Electronics

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Full size screen version of Pet is launched

THE full-sized screen version of the Pet (CW, January 3) was launched at the Hanover Fair in April. It has 18K-bytes of firmware and 32K-bytes of user RAM, and is designed for both word and data processing.

Two floppy disc drives are available with the system, called CBM 8001. The first is a double-density, single-sided disc with a capacity of 1.5 megabytes called CBM 8061, and the other is double-sided with a capacity of 1 megabytes, called CBM 8062. Both are IBM compatible.

A system comprising the 8001 CPU (based on Mos Technology's 6502 processor) an electronic typewriter and floppy disc drive costs DM15,000 (£3,700).

This is also available with word processing software. An alternative system comprising the CPU, a printer and floppy disc drive is available for DM10,000 (£2,500).

The system has advantageous features such as the availability of a colour screen, and can support peripherals of existing Pet systems. The screen is 31cm in a 25 line by 80 character format.

On the software side there are 12 new instructions in the Basic 4 programming language and a new version of operating system DO2-2 is available.

by Eileen Stainer

Maintenance service for a rapidly expanding market

Many applications areas are being created by the growth in technology, but not all their support markets have been pursued. This is particularly the case in the personal computer business where the market for maintenance is greatly under-served.

Micro News Editor Eileen Stainer talked to former DEC field service manager Jim Myson who has recently been made managing director of Terminal System Services, set up to provide hardware maintenance for various types of microcomputers.

Myson explains his philosophy, how he hopes to run TSS, and the support he will be getting from its parent, Midlectron, which is based at Belper, Derbyshire.

INTEGRATED circuit technology is changing so fast that it is almost impossible to define it at any one point in time. In turn, the application areas of LSI and VLSI devices are striving to keep up with the phenomenal pace.

One such area, the microcomputer business, which is totally dependent on the microprocessor, has succeeded in growing at a similar rate to the change in technology. Now the stage has been reached where it is no longer feasible to class the microcomputer as one segment of the computer industry.

It has expanded so much that it can quite easily be split four ways within itself. The story is not complete, however, as gaps have been left in the marketplace during the expansion. Various support businesses have not been followed up at the same pace, and consequently the market is grossly under-served.

Jim Myson, formerly of Digital Equipment's field service marketing department, has recognised this, and set about trying to correct the situation.

With the backing of Midlectron, the Derbyshire-based terminal and DEC-based microsystem supplier, he has formed a subsidiary called Terminal System Services which is aiming to provide a hardware maintenance service for various types of microcomputers (CW, June 12).

MYSON ... the consequence of failure to a small user in terms of business or financial loss could be greater than that for a mainframe user.

Myson considers it necessary to split the microcomputer segment of the industry into four separate categories, the boundaries of which will continually change to incorporate changes in technology.

These categories comprise a top end, a mid-range, a bottom end and a components sector, which all reflect their own characteristic tendencies in the marketplace.

Starting with manufacturers like Intel, Motorola and Zilog, the components sector creates a series of vertical markets and dedicated applications. The business has to cope with high engineering costs on the hardware side and high software costs.

Moving up market a little into the bottom end, Apple, Pet, Tandy and Superbrain personal computers begin to emerge along with Nascom component boards and kits. Myson recognises that these systems have a restricted level of hardware support, although both Commodore UK and Microsense, the sole UK Apple distributor, are demanding higher standards of customer support from their dealers than ever before.

The personals are low cost, bordering around the £2,500 mark at present, but all are relatively new with, according to Myson, an unproven reliability record. No multitasking is possible and each system is only as good as its operator.

On the software side, there are plenty of low cost, poor reliability programs available and these are usually in Basic. Little support is offered by dealers and software houses. Appealing to computer enthusiasts and hobbyists in education and increasingly in small business, personal computers are high volume business.

Systems like Cromemco and Horizon, Myson defines as mid-range. They cost between £1,500 and £7,500, have a better physical construction than the personal computers, possess multi-user facilities and can be used with larger discs. They are also available with reasonable hardware support.

Software for the mid-range systems comes in a variety of languages such as Cobol, Basic, Pascal and Fortran, but again minimal support is offered.

A fair range of packages are available to the user. The sales area exists for vertical markets, dedicated applications and commercial systems, and is primarily a low volume business.

Included in the top end of the market are the Hewlett-Packard range of microcomputers, the DEC LSI-11 and Data General's Micronova, which cost between £2,000 and £15,000. These systems have full multi-tasking facilities and, unlike the other three categories, can be upgraded.

Software is proven and comes in complete ranges of program languages with communication software available. Both hardware and software are fully supported. Myson recognises this category as addressing a general, high volume sales area.

With the microcomputer marketplace now defined it is easier to decide what sort of maintenance service is required and where.

At the component level of the market, service needs for hardware and software can only be supported by the manufacturing or supplying company. For example, if a program error is detected when running a program from ROM, the user has but one option — to return the ROM chip.

Myson stresses that the picture is very different with regard to the high volume business of personal computers at the bottom end of the market, which is certainly inadequately supported. He has developed a three-tier service to satisfy low, medium and high customer expectations.

High customer expectation calls for a speedy on-site service, where the engineer can arrive at the scene, detect and correct a fault within a few hours. This type of service is charged at a percentage of the system value per annum, which can be anywhere between 5% and 30%. However, this is not really a cost-effective solution for personal computer users and Myson advises that a spare system would make more economic sense.

For a medium level of customer expectation a one and two day response is required. Lower still, the systems can be taken to a maintenance depot for repair and then returned. Myson will be concentrating on this type of service for personal computer users.

Mid-range systems, being a low volume business, are usually serviced by dedicated support organisations and, according to Myson, require no further support.

At the top end of the market, an area already well supported, exists high volume business, which calls for the three tier service. Terminal Systems Services is offering a four hour or less service response time for high volume quantities, including Midlectron's distribution of DEC-based systems, and range of terminals for this area.

So Myson opted for TSS to support the top and bottom ends of the market with the three tier system. For £25 plus parts and VAT the user can obtain the "return to workshop" facility offered by TSS for each unit that goes wrong. Myson is planning to set up a network of service bases throughout the UK to control this.

For 15% of the system valued at the high end the user can obtain the on-site service, which will be backed up by an already established Midlectron transport system that covers the UK.

Myson's policy originates from the fact that to a small system user the consequence of hardware failure in terms of business or financial loss could be greater than that of a mainframe failure to a large industry. It necessitates the microcomputer purchaser realising service needs before choosing a product type.

Software support for Sinclair

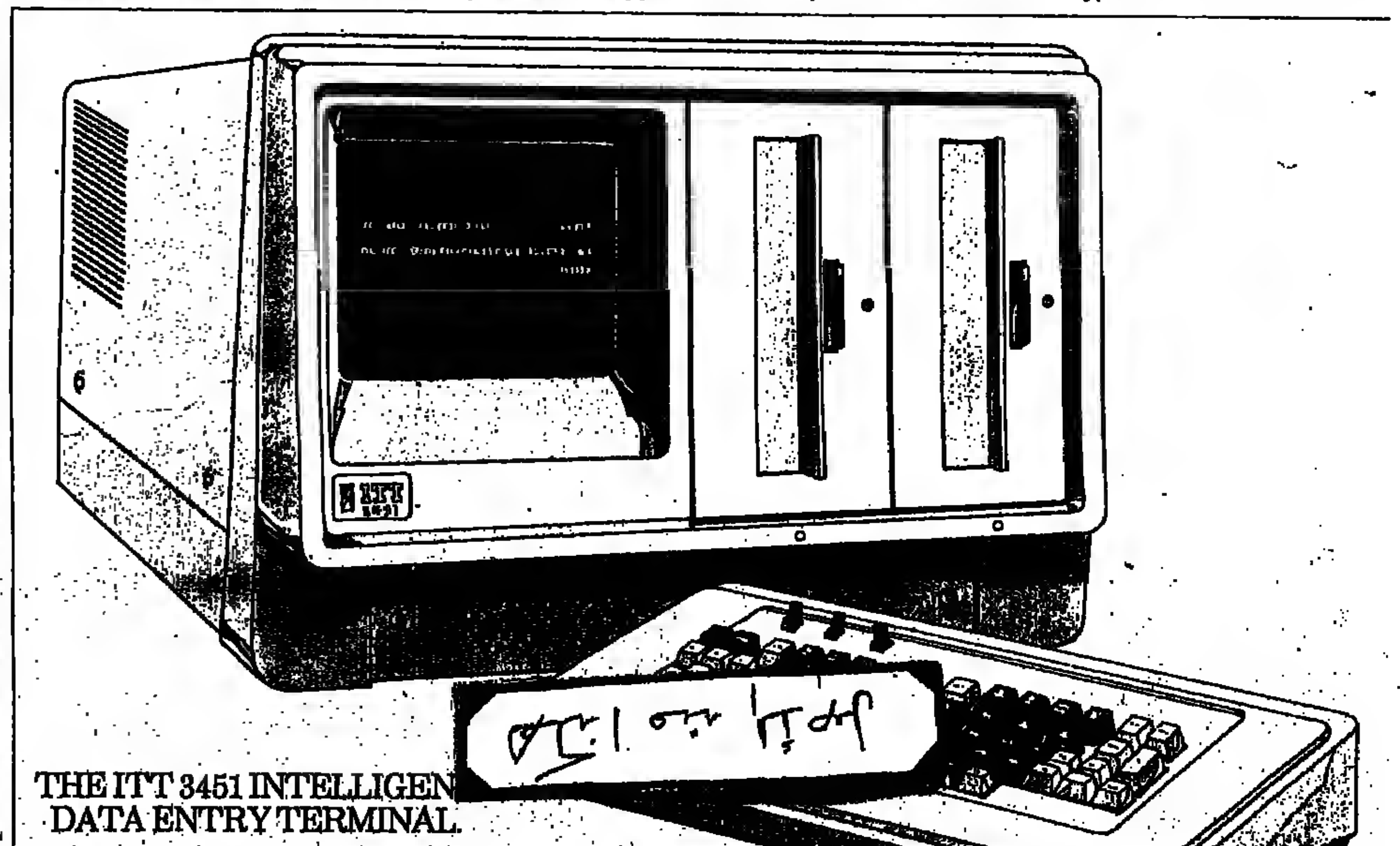
SOFTWARE to support Sinclair's ZX80 personal computer will be available from ACT Petsoft in August. At the same time the 8K system upgrade will be released.

ACT also plans to support the five best selling portable personals out of those recently launched, which include Newbury Laboratories' New Brain range, the Acorn Atom and the new Atari systems.

Discount for Polytechnic

KINGSTON Polytechnic has obtained a discount maintenance service from Terminal System Services in Belper to support its Pet and Apple personal computers, Televideo terminals and micro equipment.

Each Pet and Apple unit will be repaired for a basic annual charge of £40 plus VAT, while the Televideo charge will be dropped from £35 per unit to £30 per unit. The Tricall service means that when three units go down they will be collected and repaired by TSS.



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Research lab set up by Westinghouse

WESTINGHOUSE Electric is establishing what will be the biggest and, it says, the best equipped robotics laboratory in the US. The company, which had sales over $7 billion in 1979, has been using industrial robots in its factories for about three years. It plans to install several hundred new robots on its assembly lines by the end of 1981.

According to Tony Massaro, the lab's new division manager, Westinghouse will use the lab for three different applications: testing robots against their manufacturers' own specifications; testing the robots' usefulness, and debugging them; and devising new applications.

The lab is now being set up at the company's research and development centre in a suburb of Pittsburg, Pennsylvania. Sixty per cent of the equipment has already been installed, and Westinghouse officials say the lab should be ready to roll by the end of this year. The cost of building the lab, as well as funding research there, is expected to come to several million dollars.

But how much will the use of robots in Westinghouse's laboratories save?

"You can't generalise about savings," answers Massaro. "In some cases, there are no dollar savings. But you have a more consistent product. And you can eliminate potential worker health hazards."

He explains that many companies have a difficult time complying with State and federal worker safety regulations. Most dangerous jobs are heavily regulated, protecting the health of the worker. But robots, Massaro says, need no such protection. "When a robot loses a finger," he explains, "it's no big deal."

Like most companies that use industrial robots, Westinghouse does not make robots. Instead, it buys them from the dozen or so firms that do, a group that includes Unimation, ASEA and DeVilbiss.

£1 billion sales by 1990 forecast for US robots

COMPARED with their counterparts in several other industrial countries, US companies at present use few robots. Japanese manufacturers, for example, use some 35,000 robots, ten times more than do their US counterparts.

Nonetheless, the US market for industrial robots is growing at a good clip. Last year, about 15 robot manufacturers and distributors sold some $60 million worth of their machines in the US — a 105% increase over their 1978 sales, which totalled less than $30 million.

This growth rate is likely to continue, and some industry experts predict annual robot sales in the US exceeding $1 billion by the end of the 1980s.

The largest single group of robot users in the US is the automotive industry. General Motors, a pioneer in the field of industrial robots, has about 225 of the machines; Ford has some 250 mechanical arms, and Chrysler uses about 200 robots.

However, automotive firms' productivity rates, which robots supposedly improve, have not been good. Experts say it is too early to judge the machines.

"Robotics is a small industry," says Jim Albus of the National Bureau of Standards, "and the trends have yet to be studied. As of now, productivity data is scattered." NBS has been active in robotics, working to develop industry standards as well as conducting research in the field for other government agencies.

Additionally, neither robot manufacturers nor distributors are anxious to describe their business in detail. "Everyone in the business is afraid to talk," says Cincinnati Milacron, a robot manufacturing company. "We've got a good thing going and we don't want to encourage others to get in on it."

The effect of robots on employment levels is also unknown. Many robot suppliers say that their machines actually increase employment. Others take a different approach to the problem — worker safety.

"A robot doesn't take a man out of a job," explains a spokesperson from DeVilbiss, distributors of spray-painting robots. "It takes him away from a boring or dangerous environment."

No complete surveys document the robotics marketplace but most industry observers agree that the field is dominated by one name — Unimation.

Unimation was founded in 1958 by Joseph Engelberger, a physicist. His numerous contributions to robotics are commemorated by the Robot Institute of America, RIA, the industry's trade association, which has named its highest accolade, the Joseph F. Engelberger Award, after him.

Today Unimation, headquartered in Danbury, Connecticut, manufactures 10 different industrial robots ranging in price from under $25,000 to over $100,000.

Unimation claims to control about 75% of the US robotics market, but many experts quote numbers closer to about 40% or 50%.

Along with most of the US robotics companies, Unimation has close ties with the automotive manufacturers. One of its robots, the Programmable Universal Machine for Assembly, Puma, was developed in collaboration with engineers from General Motors. Puma will be used by the automotive giant to assemble small, lightweight components — over 90% of the parts in a GM car weigh less than five pounds.

Neither the individual companies nor the association publish accurate market figures. For this reason, a number of robot vendors can claim the No 2 spot behind Unimation. Cincinnati Milacron says that its 1980 dollar volume will exceed that of Unimation. "The exact figures are a secret," explains the company, "but we're going to give Unimation a run for its money."

Cincinnati Milacron markets two robots, its standard model T³ and its heavy-duty model HT³. Prices start at $65,000 for both models, and go up as special software and tool fittings are added.

Although the company has made robots only since 1977, demand for its computer-controlled machines has grown to the extent that the company built a new factory for robot manufacturing last year in Greenwood, South Carolina. "We're just at the start of an explosion," says a spokesman. "During the last six months, we've had orders coming in for tens and even hundreds of robots."

Besides building robots, the 96-year-old Milacron also manufactures machine tools, plastic equipment and semiconductor materials. The company, which employs about 13,000 workers in six countries, reported 1979 sales of nearly $750 million.

Another company making claim to the No 2 position is Prab Conveyors, of Kalamazoo, Michigan. The company says it now has some 900 robots in the field, although it is not disclosing any actual sales figures.

In order to enlarge its robotics offering, Prab recently bought AMF's Versatran Automation Systems division, which has been making robots since 1958. The acquisition also gave the Kalamazoo company AMF's established worldwide market coverage.

The basic Prab robot sells for about $24,000. The Versatran robot starts at $40,000 and ranges up to about $110,000. Prab, which has been manufacturing robots since 1969, also makes bulk conveyors for the pharmaceutical and metal industries.

The DeVilbiss company, which markets a Norwegian-made robot, dominates a field where there is little competition: spray painting. Trallfa, the manufacturer, says that its machines account for 95% of this robotics market.

The DeVilbiss/Trallfa robot is priced between $70,000 and $100,000. The high end of the price range includes options such as computer control, noise filters, alternate arms, water cooling, and counterbalances which allow the robot to be installed upside-down from a ceiling.

Trallfa, which also manufactures transport equipment, entered robotics in 1964. In 1974 DeVilbiss and Trallfa signed a marketing agreement, giving the Toledo, Ohio vendor a firm footing in the small market.

Since then, DeVilbiss has sold about 100 Trallfa robots in the US.

Newspaper launch delayed

AN uninterruptible power supply which interrupted has been blamed for the delay in getting out New York's newest newspaper, the Wall Street Final. Intended to be on the streets with the day's closing prices by the time the broking fraternity heads for home, the paper did not hit the streets until 7.45 pm when it launched last week.

According to publisher Michael Goldstein, the problem was caused by a malfunction, late the previous week, in the power conditioner for the computers. He is quoted by the Wall Street Journal as saying the malfunction "caused the computers to conk out" and the damage could not be fixed in time to meet the launch day deadline.

Call for papers

PAPERS are invited for presentation at PTC '81, the Pacific Telecommunications Conference, which is to be held on January 12-14, 1981, at the Ilikai Hotel, Honolulu, Hawaii. The objective of the conference is to provide a forum for the discussion of technical, economic, regulatory, and social aspects of communications throughout the Pacific. Three copies of papers should be submitted no later than July 18, and should not exceed twenty pages. The conference is organised by the Pacific Telecommunications Council. For further information, contact Richard Barber, 2424 Maile Way, Room 704, Honolulu, HI 96822. Tel: (808) 941-3789.

On takeover trail

FURTHER consolidating its position in the graphics market following its takeover of the plotting side of Calcomp, Sanders Associates is planning to acquire digitiser manufacturer Talos Systems of Scottsdale, Arizona in a share exchange deal valuing Talos at about $[illegible] million. Talos had profits of $705,000 on turnover of $[illegible] million last year.

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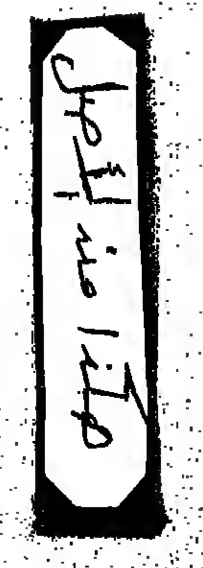


The Elbit plant in the hill village of Dalyat-el-Carmel, where VDUs and micros are made.

Israeli-Arab joint effort

HIGH on a hilltop above Haifa in the little Druze village of Dalyat-el-Carmel is one of the world's most unlikely sites for a VDU and microcomputer manufacturing plant. Yet that is where Elbit, Israel's only computer manufacturer, has chosen to build its DS 2000 and DS 1920 displays, and a forthcoming microcomputer built around three Zilog Z80A chips.

The setting and the plant are unlikely for several reasons. Although Elbit owns the manufacturing equipment, the factory is owned by the Druze Arab plant manager — who also happens to own nearby land on which test drillings for oil have proved encouraging. And since there are believed to be only about 200,000 Druzes all told, the majority of them in Lebanon and Syria, it is a little surprising that the main employment for one of their settlements should be something so esoteric as making VDUs.

The Druze Arabs are a sect formed about 1,000 years ago, and despite their small numbers, have miraculously survived into the twentieth century.

A confluence of interests brought Elbit and the Druzes together. Appropriately for a company 37% owned by Control Data, Elbit established the plant in a community where opportunities for work were very limited. In return Elbit gets a co-operative workforce, willing to accept comparatively low rates of pay.

It is easy to be cynical about such ventures and dismiss them as exploitation of cheap labour, but without Elbit it is unlikely that there would be any work in Dalyat-el-Carmel — and the fact that other companies have not followed Elbit up the steep mountain roads to the village suggests that it took imagination and a substantial personal effort to win the interest and the co-operation of the independently-minded Druze community.

Brazil viewdata trial

BRAZIL'S Ministry of Communications has given its authority for a three-year viewdata trial to be run by Telesp, the country's largest telephone company, which operates in the State of Sao Paulo.

The project is being managed by Brasilinvest, a merchant bank and development company which conducted a feasibility study from last November. The trial is planned to start late next year with 1,500 terminals in homes and offices.

Several UK viewdata adapter makers have quoted to supply, and it is likely that local manufacture will take place under licence from one of them.

The systems for the expected five viewdata centres are expected to come from either British Telecom or Aregon International, since the Canadian Telidon system is thought likely to make terminal manufacture unnecessarily complex.

The Aregon system is favoured for the possibility of running it on Brazilian-made computers. But Telesp would rather do business with a fellow telecommunications administration and buy British Telecom's Prestel system, which is designed to run on GEC 4080s, if a technology transfer could be arranged to enable the 4080s to be made locally.

China's first

CHINA has bought its first used computer of any substance, an IBM 370/138, from OPM Leasing of New York.

Siemens adds four models to 7.500

UNDERLINING that it really means business these days, the revitalised Siemens Data has added four more models to its 7.500 line of small and medium-scale mainframes. Pre-announced as Siemens' answer to the IBM E-series, the line now covers a much broader spectrum than IBM's 4300 range.

Most striking feature of the new machines is that they will be built in emitter-coupled logic, ECL, circuitry designed and manufactured by Siemens, and will be backed by Siemens' own 64K-bit memory chips.

ECL is a high-speed technology until recently used only in large computers because its high power consumption caused cooling problems which were difficult and expensive to solve. ICL in collaboration with Motorola was one of the pioneers in its use, and all the 2900s from the 2970 up use ECL.

Amdahl's 470s also use ECL, and it is the technology expected to be used by IBM in the H-series.

In the past couple of years it has been introduced in lower level products, notably the Univac 1100/60 and the SEMS Mitra 525 mini, both of which use the Motorola 10800 ECL bit-slice micro.

Smallest of the four new models is the 7.536, which is a direct counterpart to IBM's 4331 Model Group 2 (CW, June 12). The 7.536 has an 8K-byte cache and two or three megabytes of main memory. The 7.351 has a 16K cache and up to eight megabytes of main memory, while the 7.361 is a dual-processor version also with up to eight megabytes, offering double the power of the 7.351, and a 32K cache.

The 7.571 is also a dual processor machine, four or eight megabytes of main memory and a 64K-byte cache.

All four are set for first shipments in the first quarter of next year, and the machines are announced in Siemens' Continental markets.

All the 7.500 machines — there are additionally a 7.521, 7.531 and 7.541 — run under the BS2000 operating system, which is akin to IBM's OS operating systems.

Prices online from US

UP-TO-DATE specifications and prices for computer products listed in the Auerbach reports will soon be available over Tymnet and Telenet from Bibliographic Retrieval Services of Scotia, New York.

A sample database is already up on the BRS system, two 370/155s with accelerated memory, and the full service is due to be available in the autumn.

BRS has its own retrieval software, which is based on IBM's Stairs with modifications and enhancements, and the software is to be offered as a product by the company from July 1.

The Auerbach service will be updated daily and will be accessible by any subscriber with a Tymnet or Telenet-compatible terminal. Auerbach has not yet decided whether it will be offering a specific terminal to customers.

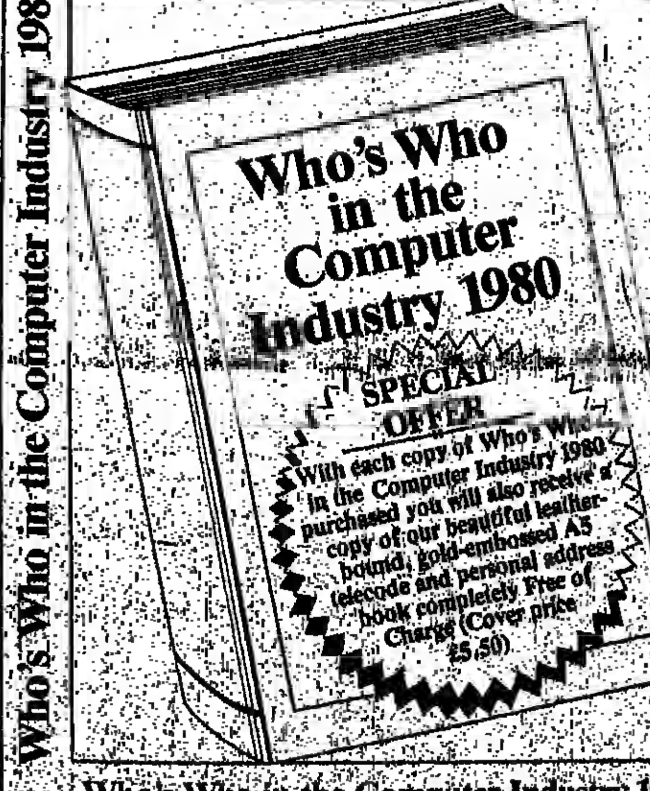
5,000 Micrals

FRENCH microcomputer pioneer R2E, 60% owned by CII-Honeywell Bull, has installed its 5,000th Micral microcomputer. Turnover in 1979 rose 50% to FF 35 million, £3.85 million on which it made a profit of FF 1 million.

Japan-US cable

AS part of the Japanese government's policy of increasing the amount Japan buys from abroad, Nippon Telephone and Telegraph has proposed to American Telephone and Telegraph a joint project to develop a submarine optical fibre cable for use between the two countries.

Who's Who in the Computer Industry 1980



•Published August 1980•

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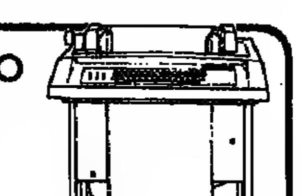

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60% of tellers will have terminals by 1990—PA

BY 1990 European bank staff directly serving the public will be aided by teller terminals at 60% of counter positions. This is one of the main predictions in a $1 million study* into bank automation over the next decade now available from Pactel, the computers and telecommunications division of management consultants PA International.

The study also predicts a big increase in the number of cash dispensers and automatic tellers from 6,300 today to 50,000 by 1990. But the overall impression is that there will be no revolutionary changes in European bank automation over the next 10 years.

Pactel interviewed 270 banks in 13 countries throughout Western Europe and found that most expected their computer operations to be still based on centralised systems in 1990.

Lack of enthusiasm for distributed processing stemmed from the size of investment in centralised systems, the unproven economic advantages of distributed processing, the centralised nature of the management and security.

There is also a very cautious attitude to electronic funds transfer systems and Pactel concludes that only some small local EFTS networks would be set up during the 1980s.

One network already in operation is at Bourg en Bresse in France where more than 50 merchants have IBM 3608 terminals linked online to an IBM 370/138 at the Banque Regionale de L'Ain so that customers' accounts can be directly debited (CW, March 15, 1979).

In the UK, Barclays Bank is involved in a pilot project called Counterspeed with six petrol stations in the Norwich area where a customer's current account or Barclaycard account can now be directly debited.

Truncation, the method by which banks avoid the expensive and labour intensive process of physically exchanging and sorting cheques, will also make slow progress in the 1980s, according to Pactel. Developments in this area include experiments with cheque image capture, transmission and sorting being carried out by NCR in co-operation with the Bank of America in California (CW, November 9, 1978) and by Burroughs in conjunction with the Midland Bank in the UK (CW, March 1, 1979).

The study embraces building societies and international banks with operations in Europe, but merchant banks are not included. Looking at the US banking industry the study predicts that banks here will be spending $400 million a year on automation by 1990 and that the value of all kit installed by them will be $2,100 million.

ICL is hoping to capture a share of this business through its marketing agreement with bank terminal manufacturer Fortronic, which has been extended to cover product development (CW, March 13).

The study, originally commissioned by several suppliers of bank automation equipment, is now available in several versions and subsets costing from $2,000 upwards to $15,000 for a complete study.

*Automation in European Banking 1979-1990. PA Computers and Telecommunications Ltd, Rochester House, 33 Greycoat Street, London, SW1P 2QF. Tel: 01-828 7744.

Systems builders order Primes

FIVE Prime 150 computer systems have been ordered by Alternative Business Systems, a UK firm of systems builders that specialises in turnkey systems for real time commercial applications such as sales order processing. Employees run the company from their own homes with the help of a network of freelance programmers.

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Rival standards for local networking

LOW-COST local networking using multiple Z80A-based processors has been announced by Zilog. Called Z-Net, the principle of the facility is to use low-cost hardware in order to give each user local computing power while sharing high-cost peripherals such as printers and large discs between several users.

The single data channel which connects the Z-Net elements is a low-cost coaxial cable running at 800,000 bits per second. Stations can be added or taken out of the network with no disruption provided a T-tap is already available in the cable.

Key to the system is the multitasking operating system kernel which runs in each processor on the system up to a maximum of 255. There is a network software overlay for all nodes which need to communicate, and the packet protocol itself consists of five layers: the applications layer, operating system layer, network control layer, data link layer and physical link layer.

Two kinds of station are presently supported, both driven by the Z80A. The MCZ-2 is an existing business microcomputer, and can be configured as a multiline controller offering IBM 2780/3780 support for communication with the outside world. The new SDS 2/01 shared data station consists of a 10 megabyte cartridge drive with dedicated processor.

Languages offered are Cobol, Basic and PL/Z and because of the well-defined interfaces between the operating system layers, users can write their own operating software to enhance the basic kernel.

The Z-Net system will be sold primarily to OEM systems houses and to large users with in-house programming capability. Deliveries are within 60 days of order.

DEC, Intel, Xerox joint specs developments

SPECIFICATIONS for a local area communications network are to be developed jointly by Intel, Xerox and Digital Equipment, and published this summer.

The companies feel it is in their interests, as well as in the interests of users and other manufacturers, to provide for the compatible interconnection of a wide range of information handling products at low cost, and aim to give a good boost to their method of achieving it.

Several other manufacturers are said to be interested in making compatible systems and components, and the partners are keen to have the specifications adopted by official standards bodies.

The network design is based on Xerox's Ethernet, which was published last December after five years of experimental in-house use. It involves broadcasting packets of data at ten megabits per second along one or more coaxial cable links each up to 500 metres long. Devices are attached to the links via transceivers which grab packets addressed to them and monitor the cable to avoid as far as possible transmitting when another device is already doing so.

Transceivers can also act as gateways to other types of network or to telecommunications links. Packets have a 48-bit address field and a variable length data field.

Intel is providing expertise in partitioning the communications functions into microcomputer systems and VLSI devices while Digital is providing expertise in transceiver design and computer network operation.

Consumer electronics market survey

CONSUMER electronics is the field covered by the latest of four industry surveys published by Venture Development Corp in the US. The surveys, called Venturecasts, are available at $1,950 each in the form of a 350-page book of statistics and forecasts taken from major specialist periodicals and organised in the categories of the US government's Standard Industrial Classification.

They are backed up by a phone-in service on the latest information, the price of which is included in the subscription.

It is planned to put the information on to a computer within the next year, either in-house or in co-operation with an existing online information service such as Lockheed, Dun and Bradstreet or the New York Times Information Service.

The other three surveys published in the last nine months were on computer communications, semiconductors and other components, and instrumentation.

The consumer electronics survey deals with issues including viewdata and teletext revenues projected until the year 2000, projected personal computer and language translator markets, and current demand for electronic games.

Venture Development Corp is at One Washington Street, Wellesley, Massachusetts 02181.

COMPANY NEWS

INVESTORS and analysts have long gauged a company's attractiveness as an investment by dividing the price of a single share by the earnings per share to produce a "price-earnings" or PE ratio, and go on to talk about a company selling at "only three times earnings" or at "almost 20 times earnings".

A low price-earnings ratio can mean, for instance, that future profits look uncertain and that a lower dividend may be paid. A high price-earnings ratio implies expectation of rapid profit growth.

US analyst Ronald Burger of Dean Witter Reynolds has found another gauge of a company's worth useful: the price-to-research ratio. This is arrived at by dividing the amount a company spends on research by the number of shares outstanding, and then dividing this into the share price.

COMMENT

A company with a low price-to-research ratio is regarded as attractive to Burger, and in the computer field, Control Data and National Semiconductor, selling at between five and six times R&D expenditure, look particularly interesting to him.

Applying the same yardstick to ICL suggests that those who say it is still significantly undervalued by investors are right.

Unlike US companies, ICL does not reveal its R&D expenditure, but it is at least 6% of turnover. Assuming that the company will report turnover of about £740 million this year, that means at least £50 million for R&D. That works out at 44.9 pence per share, and at last Thursday's closing price of 146 pence, ICL is selling at only 3.3 times research expenditure.

By Burger's yardstick, ICL shares are a snip at their current price.

Racal gets back into its old groove

THE deal Decca did with Polygram in connection with the transfer of its records business will cost Racal more than expected but otherwise, the outlook for Racal in 1980-81 is fairly rosy.

Hit principally by the tardy placement of large overseas orders for tactical radio, reported at the half-year stage, Racal's pre-tax profits were up only 3.25% at £63,824,000 on turnover up 18.3% at £203.7 million.

With Decca consolidated, Racal is looking for its legendary historical growth to resume in the current financial year, with the target £500 million.

Decca is expected to contribute £150 million to this figure and to break even. Losses from Decca, originally put at £8 million and subsequently revised to £10 million, will be even more, although Racal cannot say yet by how much. All the losses are attributed to Decca's consumer businesses and the Decca TV company is up for sale.

Most dramatic turnover surge came in the data communications field with the small Racal-Vadic of Los Angeles leading the way. Sales were running at $12 million before Racal acquired the company; they rose to $20 million the following year and are now up to an annual $32 million.

Racal-Milgo is also doing well, particularly in network management systems for large customers and as a result the data communications group stormed ahead more than 40%.

As a result, data communications has overtaken radio communications as the biggest single group in Racal, for the first time. Radio fell from 44% to 38% of the total business, while data rose from 32% to 39%.

In the future, Racal looks forward to the four newly-formed Racal-Decca companies competing as a group with radio communications and data communications to be the biggest money spinner.

The four new Racal-Decca companies are defence radar, navigation, marine radar and survey.

Plug into Mexico

REFLECTING the attractiveness of Mexico as an investment base now that the country has been found to be floating on a giant oil field, Northern Telecom of Canada has formed a joint venture with Alfa Industries of Monterrey to manufacture Northern Telecom's SL-1 and SM-1 digital telephone switching systems.

Trend reversed

FURTHER evidence that the declining cost of computer hardware has gone into at least temporary reverse, comes from Amdahl. In the US the company has increased lease prices on its V/7 and V/8 computers between 7% and 13.6%, while the sale price of the V/7A goes up 12.6% on July 1.

Maintenance charges rise by 5% to 7%.

On the move

THE UK side of data capture and distributed processing systems supplier, MDS, has changed its name from MDS Data Processing to MDS Computer Systems (UK) Ltd. The firm has moved its UK headquarters from Victoria, SW1 to 84 Upper Richmond Road, Putney, London, SW15. Tel: 01-874 8404.

Consult service

BRITISH Telecom has announced that its National Data Processing Service has joined the Telconsult consultancy service, which was formally set up last year, to add computing to the expertise it sells overseas.

'Substantial' losses for Logabax

LEADING French OEM peripherals and small systems manufacturer Logabax has confirmed that it made substantial losses in 1979 (CW, January 17), but says it is not yet able to quantify them because of changed accounting rules.

Turnover, however, is clear: the company grew 27.4% to FF 470 million, about £92 million, with exports accounting for FF 127 million, up 24%.

The company has implemented stringent plans for the current year to get its business back into profitability.

Computer firms top US business league

TWENTY-FIVE of the top 100 small companies in the US are in the computer and computer equipment business. The ranking, arranged according to percentage increases in sales and revenues for 1975 and 1979 financial years, has Tandem Computers and Cray Research at its head.

The list was compiled by Inc Magazine, a journal which focuses on "the big business of smaller companies". To qualify, companies had to be independent, publicly held, at least four years old and having a turnover of less than $25 million in 1975.

Tandem of Cupertino, California, maker of multiple processor systems, is No 1 on the list with a compound annual sales growth rate of 358%. No 2 is large scale system manufacturer Cray Research with a compound annual growth rate of 338%.

Other computer companies in the list include Cado Systems, Floating Point Systems, DPF, Printronics, Prime Computer and Paradyne.

In addition, some of the companies were among Inc's top 20 performers ranked according to productivity and profitability. Data Terminal Systems ranked No 2 in profitability with its net profit as 20.2% of its sales. Cray Research, with its net profit as 18.3% of its sales, was No 3.

CW SHARES TABLE

Date: 20/6/80 — Index: 94.10 Change: +1.67

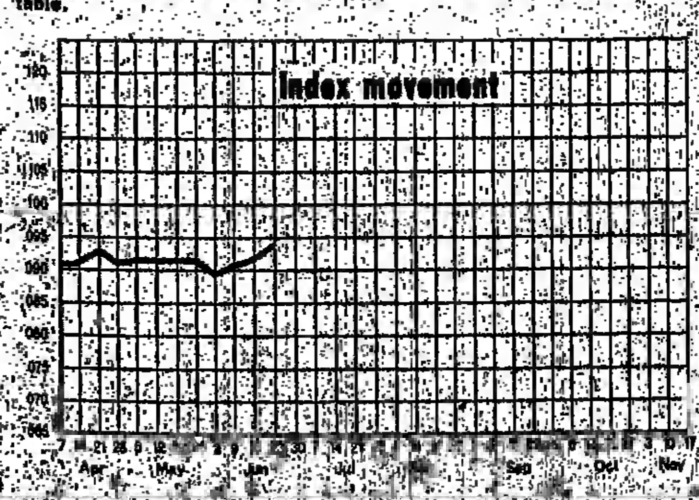
London Stock Exchange

1980 High (pence)	1980 Low (pence)	Stock	Price (pence)	C'nge
397	230	A Comp Tech (25p)	397	+29
43	29	B Bov Kent (25p)	30	–
£37	£28½	Burroughs ($5)	£28½	–£1
78	45	Chloride (25p)	48	+3
120	84	Chubb (20p)	88	+1
100	64	Cole (R.H.) (25p)	81	–3
710	540	De La Rue (25p)	710	+10
180	148	Extel (25p)	168	–6
650	407	Ferranti (50p)	650	–
394	335	GEC (25p)	394	+24
£43¼	£30⅛	Honeywell ($1.50)	£33⅛	+£⅞
£31	£23	IBM ($1.25)	£24¼	+£⅛
147	118	ICL (25p)	143	–4
74	64	Kalamazoo (10p)	72	+1
240	205	Kode Inter (25p)	235	+10
£26¼	£20½	Motorola ($3)	£20½	–£[illegible]
270	138	Muirhead (25p)	138	–2
£111	£78	NCR 4% 85/90	£83¼	–
£152½	£125	Perkin-Elmer 4%	£140	[illegible]
470	375	Philips Lamp (Fl 10)	383	–2
180	108	Plessey (50p)	180	+7
380	190	Racal Elect (25p)	356	+8
84	65	Rediffusion (25p)	74	+3
£13½	£10¼	Rockwell ($1)	£11¼	+£[illegible]
£56⅛	£40½	Schlumberger ($1)	£49¾	+£2¼
£24⅛	£19¼	Sperry Corp ($0.50)	£20	–£[illegible]
£21	£16½	TRW Inc ($1.25)	£17⅜	+£[illegible]
324	267	Thorn-EMI (25p)	300	+16
£25¼	£21⅛	Xerox ($1)	£22⅛	+£½

New York Stock Exchange

1980 High ($)	1980 Low ($)	Stock	Price ($)	C'nge
18⅞	14¾	AM International	15⅞	–[illegible]
27⅞	17⅝	Ampex	18⅛	–[illegible]
39⅛	33¼	Automatic Data Proc	37	–1⅛
84	65⅛	Burroughs	67⅛	–2⅛
23¾	16⅜	Computer Sciences	20⅛	+1⅛
60¼	46	Control Data	54	+[illegible]
78⅛	50½	Digital Equipment	[illegible]	+[illegible]
[illegible]	[illegible]	Harris	37⅛	+1⅛
[illegible]	[illegible]	Hewlett-Packard	61	–3
97⅝	[illegible]	Honeywell	77	+3⅛
74½	55¼	Intel	65¼	–1¼
70½	51⅛	IBM	[illegible]	–[illegible]
18⅞	11½	Memorex	14½	–[illegible]
61¼	42¼	Motorola	47⅞	+2⅛
28	17¼	National Semi	22⅞	+[illegible]
78¼	53¼	NCR	67⅜	–2½
46	27	Perkin-Elmer	45½	–[illegible]
30½	18	Rockwell Inter	[illegible]	–1⅛
[illegible]	95	Schlumberger	113¼	–2¼
67⅞	42¾	Sperry Corp	47⅛	–1⅛
		Storage Tech		
43¾	[illegible]	Tandy	41¾	–2
63½	45⅛	Tektronix	49⅞	+3⅛
104	[illegible]	Texas Instruments	93½	–1⅛
47	36	TRW	40½	+½
2½	[illegible]	Wyly	7⅛	–[illegible]
66½	55⅛	Xerox	[illegible]	–[illegible]

The table shows the closing prices in London and New York at the end of last week. The share index is based on the prices of the UK companies in the table.



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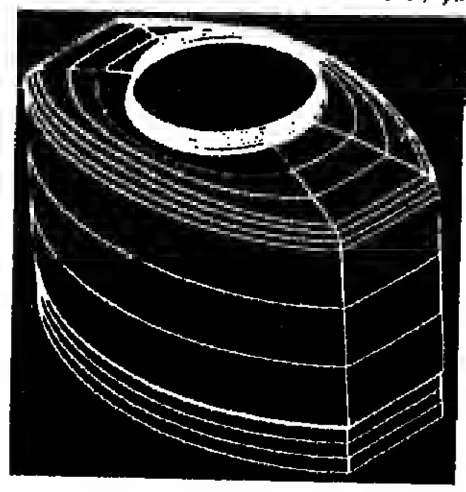


Centre dedicated to spread of knowledge

WHETHER as a result of lack of investment capital or simply ingrained conservatism, British companies have been slow to adopt computer-aided methods. The CAD Centre in Cambridge was established in 1969 to accelerate the process by assisting companies in all aspects of the move to CAD/CAM.

The Centre is a government body staffed almost entirely by employees of ICL Dataskil, and its services range from the design of large systems for chemical process control through to the production of numerical control tapes and actual components. But it is not a software bureau in the conventional sense and does not get involved with the minute detail of applications design.

"The Centre's original aim was to develop the market for computer-aided design and manufacture in engineering," said Mike Evans, manager of the manufacturing industries group. "This market is now very lively, and we are concentrating on helping companies make use of CAD/CAM in the most efficient and cost-effective way. Our part is played at system level, to help the customer integrate CAD with whatever DP systems he may have, and not, as a rule, to design components, for instance."

Basically, the Centre is concerned with the spread of knowledge. Nothing must be wasted; no job can be a once-off job. Knowledge acquired on a project must if possible be encapsulated in a re-usable form and made available to as many users as need it. This requirement has given rise to the design philosophy of "program building blocks": products designed to be used together or separately, and to form together a complete library of CAD/CAM aids. Both hardware and software "blocks" are designed to be completely machine-independent.

"Technology transfer" is a favourite phrase among the management of the Centre: experience gained in one field can often be used in another. Design projects are undertaken in collaboration with customer companies, with a two-way exchange of knowledge; the "building blocks" are marketed through agents, so as to reach as wide a public as possible; and the Centre runs a jobbing shop producing metal components and printed circuit boards, with the aim of giving small companies experience of computerised numerical control and other methods before taking the plunge into CAD themselves.

"The Centre can tackle what might, from a company's point of view, be financially a high-risk project, and use the results of the research to benefit other companies," said Evans.

"These principles are realised in the Gino suite, a series of graphics packages where modularity is carried down through various levels. The basic package is Gino-F, a set of I/O graphics routines whose modular design enables the programmer to call only on those he needs; Gino-2D is a speedy version for use in two dimensions only, and whose modules can even be bought separately; Ginograf transforms input data into graphs and charts; and Ginozone is for mapping applications. All are written in Fortran and designed to be used in a mixed language environment, on any machine.

The Centre is divided into four sections: manufacturing industry, process industries, research and development, and production services. "It is structured and run like a small company," said Mike Evans. "We are organised like the people we are trying to help, not just as a research shop." It is headed by the Director, Paul Fleet, "effectively our managing director," and a board of four controllers responsible for finance, sales and marketing, production and development, and research.

The manufacturing industries group is divided into several specialist areas in the field of development: computer-aided planning, integrated engineering information systems, numerical control and draughting systems. Its aim is to extend the technology in these areas and to provide an interface to CAD systems which can be tailored to the requirements of specific companies.

One of the group's principal products is GNC, Graphical Numerical Control, a package which provides a good example of the way in which CAD can speed up a manufacturing process. GNC helps produce input tapes for numerical control machines, thereby saving materials, man-hours and production time.

NC machines, widely used in industry for the last 15 years, are computerised lathes, drills, flame-cutters, etc, which produce components from paper tapes known as part programs. Part programming is now the most labour-intensive stage in the process of manufacturing components, and consists of defining the part exactly, enumerating the steps to be followed by the NC machine, hand-punching the tape and using it actually to produce a part. The test part will show up not only the programmer's errors of judgment and calculation, but his typing errors as well. The process is time wasting in terms of man-hours, and also of machine downtime, if programs cannot be written fast enough to supply the NC machine.

With GNC, almost the whole process is computer controlled. Initial input is the part definition, which is composed using simple geometry definitions; the part can then be displayed on the VDU and various machine movements tried out interactively, using the cursor to position the cutter on the screen. The system will also nest parts most economically on the piece of metal being cut. The system then punches out the program tape.

True to the Centre's principles, GNC is machine-independent with regard to both computer and NC machine.

The Centre is concerned with the spread of knowledge. Nothing must be wasted; no job can be a once-off job.

The process industries group is working towards the production of a library of integrated packages for the design, construction, and operation of chemical process plant.

Its Tanks package for the design of circular low-pressure storage tanks was developed jointly by the Centre and Capper-Neill International. Sections of Tanks have now been adapted by W. W. Wild (Engineers) of Mansfield, once again justifying the Centre's policy of designing for a wider applicability than the use of just one customer.

The process industries group has specialist teams working on process design, physical properties data, vessel engineering, project engineering and pipework engineering. Its packages include Concept, a comprehensive system for process design and simulation for chemical and associate industries; an allied product, Multicol, for the design and simulation of distillation columns and interlinked towers; Stem, for heat exchanger design and draughting; and PDMS, for plant and piping layout. The latter was developed in conjunction with Akzo Engineering and Isopipe.

"The group exists to aid the designer in this field, not to replace him," said Mike Evans. "There is a shortage of skilled labour in this market, and CAD techniques can supplement the available supply of workers."

The production services group offers small businesses a way of taking advantage of CAD techniques without investing in prohibitively expensive equipment. It offers part programming on a jobbing-shop basis using GNC and supplies fabrication drawings, NC tapes and printed circuit board artwork.

Pye Telecommunications has used the service to produce over 1,000 printed circuit boards. The production services group uses GNC to provide a part programming service, and has produced such items as turbine blades and ships' propellers for various customers, using the Centre's Polysurf three-dimensional machining system.

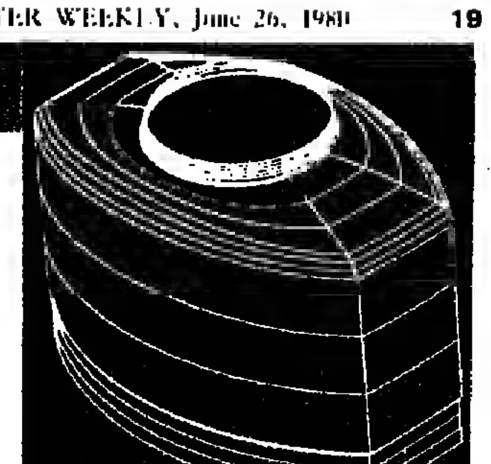
The service also enables companies to try out CAD methods before taking the irrevocable and costly step of switching from their existing systems.

The research and development group exists to develop components which can be used in engineering applications. The Gino suite was produced by this group; and the Centre is currently marketing three pieces of

● Turn to page 19

Examples of components made using the Centre's Polysurf and GNC packages.

Plans for expanding use of micros in engineering system



● From page 18

hardware it originally developed for internal use.

The largest of these, a colour raster scan display unit, goes by the misleading name of Bugstore, though its official title is AGDT, Advanced Graphics Display Terminal. It computes pictures with true perspective and shading, with hidden surfaces removed, and can handle large models, for example large urban developments. Sequences of pictures can be filmed, simulating a tour through an area. Photographs of real scenes can be reproduced and scanned, and mixed with computer-generated images.

An interesting recent application was the development of a facial recognition system at present under evaluation by the Home Office, a kind of Identikit system in which the faces are based on photographs and thus more realistic than drawings.

The colour map can be changed interactively, making the device useful in applications for designing such products as carpets and wallpapers.

Bugstore has been implemented on the Prime 300 and 400 and the PDP-11/34 and /70, and the Centre is prepared to implement it on any other machine. Several have already been sold, and more are under construction.

Other hardware products are the Remote Data Switching Unit, which allows any two terminals such as a storage tube device, printer or plotter to use the same modem connection to the computer; and the Remote Peripheral Controller, a micro-based unit which permits the connection of such peripherals as incremental plotters and paper tape readers and punches to computers which normally do not provide these options.

A staff of well over a hundred programmers needs a good deal of hardware to work on, especially as all the Centre's editing work is carried out online — there is no batch processing at all.

Prime minis and Tektronix storage tube VDUs are most heavily represented and account for most of the work done. The Primes operate a time sharing service for the Centre, mainly taken up by program development. There are six Prime machines, a 550, a 400 and four 300s.

"We chose Prime machines because the type of work the Centre does requires the use of a fairly large mini," said Cliff Jones, computing services manager. "In 1973 we were using an Atlas II mainframe with virtual storage, which could run large programmes and provide an interactive time sharing service. We looked for a machine with these features which would be able to take advantage of progress in technology and would also be one our customers could afford. The Prime machines were the only ones at the time which combined all these features, and we've been very happy with them."

The Centre also owns a Digital Equipment PDP-11, which is used for further development and support of GNC; and two Computer Automation machines, a 4/90 and a 4/30, are used for specialised program development not carried out in a time sharing environment. It is hoped that the use of the latter will lead to the development of low-cost systems for smaller companies.

Online to the Prime machines are two Calcomp drum plotters, and there is also a Calcomp 748 standalone flat-bed plotter, and a Kongsberg draughting machine which can produce pen and ink drawings and the kind of photographic output used in the manufacture of printed circuit boards.

Over the next two years, it is intended to expand the Centre's work on the use of micros in computer-aided engineering systems (which has already produced the Remote Peripheral Controller) and on database technology. Research on three-dimensional modelling and visualisation techniques will also be resumed.

Now. Argus 700 Series 2. Multipower, multispeed, multichoice, Multiprocessor.

It's the second generation Argus 700, now with multiprocessor capability, a spectrum of power going up to twice previous speeds and a better performance/cost ratio.

Multiprocessor flexibility

Argus 700 Series 2 is based on new versions of the Argus 700 F and G central processors which can be used individually or in closely coupled groups supported by a multiprocessor operating system. Putting these together in various ways gives you a performance ratio of 7:1 between the smallest and largest configurations and matches the needs of almost all control, communication and information handling applications.

Over 2 million instructions per second

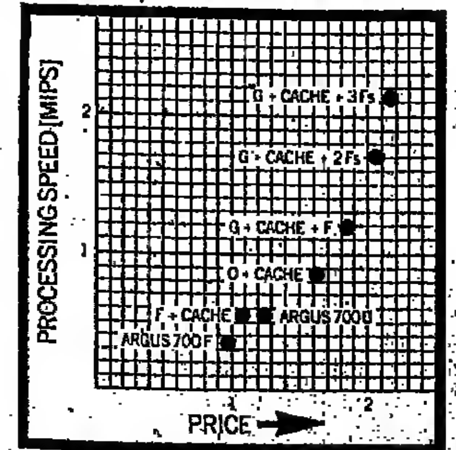
This is the typical processing speed at the top end of the range, and from the smallest to the largest configuration you'll get a cost effective system, competitively priced.

Local and cache memories speed processing

You can now use a local or cache memory for each Argus 700 F and a cache memory for Argus 700 G, in addition to the main memory. Using a cache memory reduces the load on the memory bus and can speed up processing by as much as 60%. When the local memory is used to hold a processor's program and data, local operations make no demands on the memory bus at all, leaving it free to handle high speed interprocessor communication.

Intelligent channels relieve central processors

As well as multiple central processors Series 2 hardware includes intelligent input/output channels with fixed programs to handle routine operations. They have access to the memory bus and operate in parallel with central processors. Using intelligent channels takes a lot of load off the processors. The channels work on chained input/output transfer commands and interrupt the central processor only when the chain is completed. They can trap errors and try repeat transfers on their own.



Argus 700—the right choice for dual systems

No one has more experience than Ferranti in designing computer systems for critical tasks like the control of nuclear power stations and electricity grids, where dual computers with automatic changeover are the best means of ensuring security of operation.

The architecture of Argus 700 Series 2 provides for pairs of computers to share memory and backing stores and to access common input/output drivers. You can either have a master/standby system or divide the load equally between the two computers with the provision that if one fails the other takes over the whole, or critical parts of it.

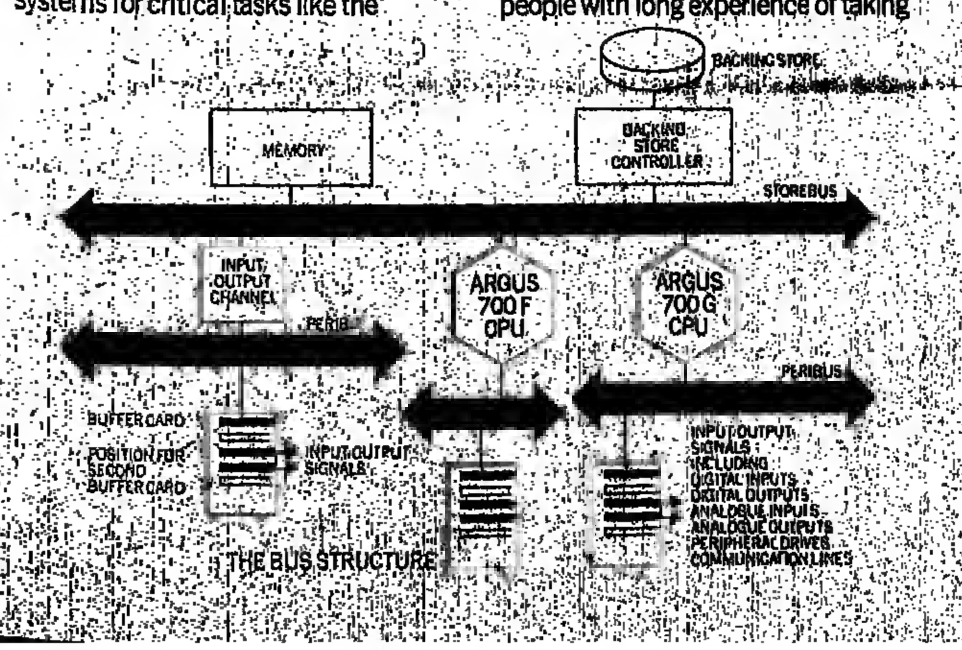
All hardware and software is compatible

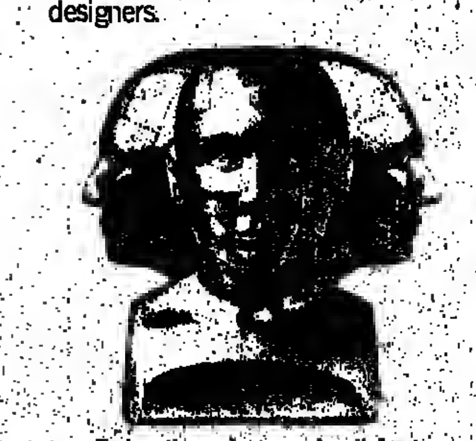
Everything in the Argus 700 Series 2 range is directly compatible with earlier Argus 700 computers and software so you'll have no problem in updating or expanding existing systems.

The system builder's computer

Ferranti are essentially systems people with long experience of taking total responsibility for system design and implementation.

We know the problems. So it's not surprising that Argus 700 Series computers are designed with the solutions in mind and are therefore first choice of so many systems designers.





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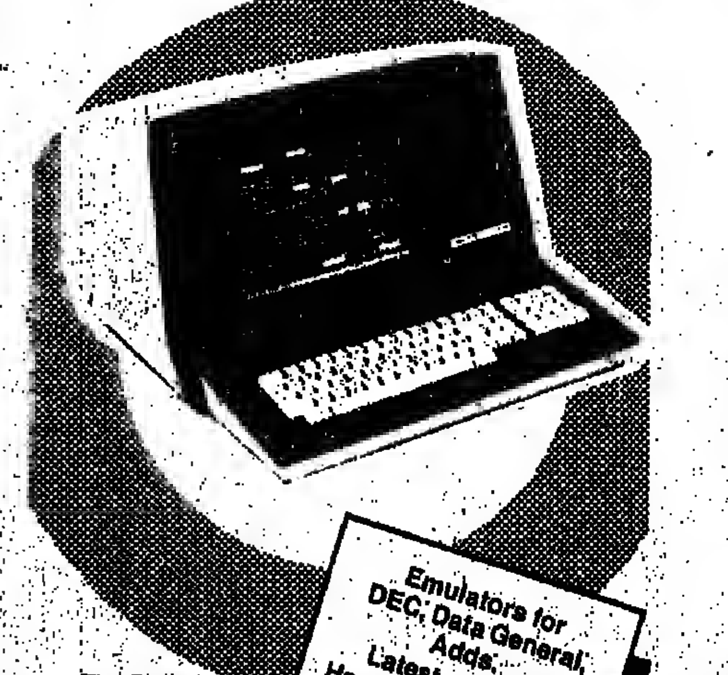

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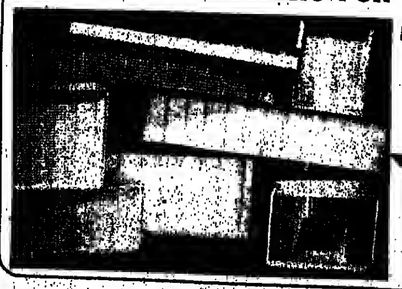

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PRODUCT NEWS

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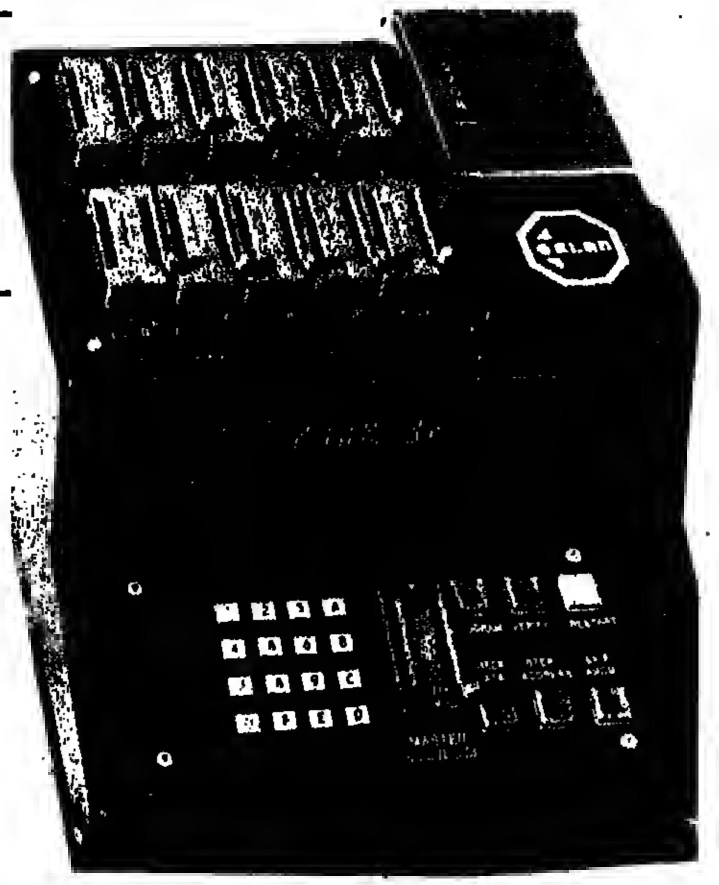
GANDALF Data Communications introduces the 9102 x-25 Depacker for use with the Datapac Network and the 9103 S-Mux intelligent data concentrator. Both products are part of Gandalf's private intelligent network (Pin) series for data communications equipment.

The Pin 9103 is an intelligent data concentrator which permits up to 32 asynchronous data links to be replaced economically by eliminating the multiple links and modems and concentrating the data on to a single high speed link, says Gandalf.

Up to 32 asynchronous ports can be connected to the network via a single Datapac 3000 link. Interactive terminals connected via 3101 link anywhere on the network communicate with the host computer via logical channels which are demultiplexed by the Pin 9102.

Gandalf Data Communications Ltd (CW), 9 Slack Road, Ottawa, K2G 0B7, Canada. Tel: (0101-613) 225 0565.



Elan Digital Systems' EPROM interactive programmer. When entry and manipulation of data is completed, multiple sets of chips may be programmed simultaneously. Personality cards are available for all current EPROMs from major manufacturers. Options are available to allow the entry of master data via tape reader or serial interface.

Double sided diskette

A DOUBLE sided diskette for dual head drives is available from the data recording products group of 3M and has three formats: 250, 512 and 1,024 bytes per record.

3M says the diskettes are suitable for IBM Systems 34 and 5110, Shugart 850 drives and other compatible systems. They are packed in envelopes and available in cardboard boxes, each of which holds 10 diskettes.

Data Recording Products Group, 3M (United Kingdom) Ltd (CW), PO Box 1, Bracknell, Berks, RG12 1JU. Tel: 0344 58502.

Plug-in board for LSI-11s

THE Bubble-Tec memory system for the Digital Equipment LSI-11, from Sintrom Electronics, costs about £1,000.

The system consists of a controller board which emulates the command of DEC's RXV/RX01 floppy disc software and can control up to 16 memory modules, each of which contains 40,960 bytes of non-volatile magnetic bubble memory storage, says Sintrom.

Sintrom Electronics Ltd (CW), Arkwright Road, Reading, RG2 0LS. Tel: 0734 85464.

Eprom interactive testing system

AN EPROM interactive programmer with an EDIT-ASSIST feature that allows the operator to enter and manipulate data before blowing multiple EPROMS has been introduced by Elan Digital Systems.

When used as a production programmer, the P30 offers simple single key operation where faults are verified, isolated and displayed, and where full details of the error may be noted, including the cause of the error such as shortened address or data lines.

When used as a development tool, Elan says the operator may alter data after the master has been entered so that modifications to the original program may be executed without tying up development kit.

For real time applications where field testing and modification to programs are required the P30 becomes a mini development system in that data may easily be changed with special instructions.

When entry and manipulation of data is completed, multiple sets of EPROMs may be programmed simultaneously. Personality cards are available for all current EPROMs from major manufacturers.

On the standard model, data is entered via a master EPROM but options are available to provide master data entry via tape reader or serial interface.

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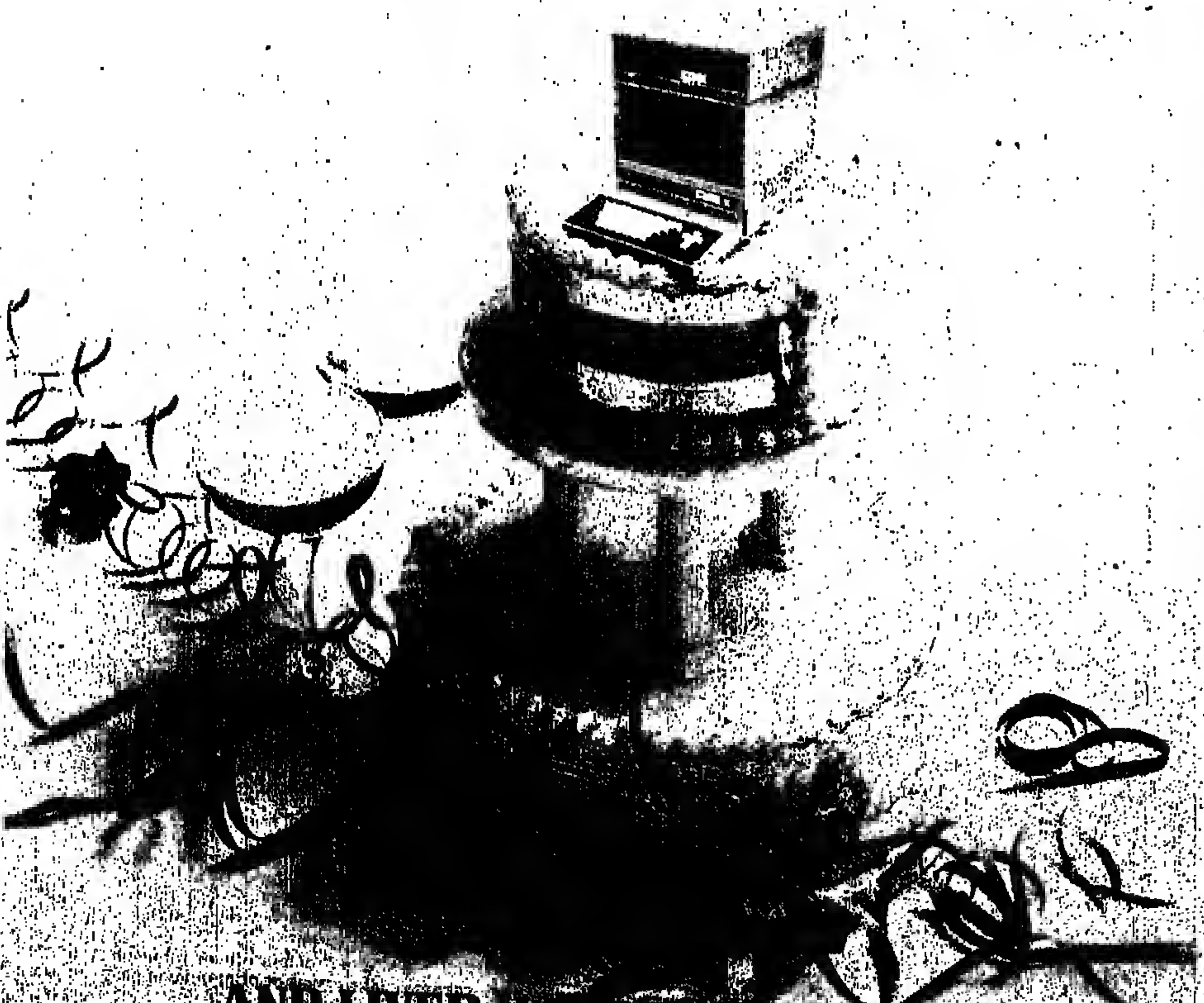

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Add-in for Vax 11/780s

FROM Mostek is a hardware and software compatible add-in memory system for the Digital Equipment Vax 11/780 minicomputer. Designated MK 8016, the board is a replacement for the DEC M8210 memory.

Mostek says the board's capacity is 32K-words x 72 bits or 256K-bytes on a single card. The card measures 15.64 x 11.93 x 0.4 inches and is based on Mostek MK 4116 16K dynamic RAM chips.

Mostek (UK) Ltd (CW), 1 Valley Drive, Kingsbury Road, London, NW9. Tel: 01-204 9322.

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NOLTON Communications has launched a family of integrated line drivers designed to offer cost advantages over conventional modems for local data transmission.

Asynchronous model 1640 and synchronous model 1630 operate over standard two or four wire DC transmission lines provided either by the Post Office or by the user, says Nolton.

These free standing models provide full duplex or half duplex point-to-point transmission at data rates of up to 19,200 bits per second. Features include LED status indicators and loop-back diagnostic facilities for fault location.

Both models use standard plug-in cards.

Nolton Communications Ltd (CW), Fieldings Road, Cheshunt, EN8 9TL. Tel: Waltham Cross (97) 33555.

Bench top tester for LSI devices

A BENCH top tester that can test RAMs, ROMs, UARTs and most other LSI devices is available from MTL Microtesting of Alton, Hants.

Called MX-17, it uses a working microprocessor assembly as a reference device, and generates logic sequences for comparison.

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FROM Portable Microsystems Ltd is an add-on 32K byte memory system for the Rockwell Aim 65 microcomputer called Atmem which is self contained with its own power supply and costs £335 plus VAT.

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No backlash from the customers over PoS systems....so far

by Nicholas Benwell

IN a part of the UK called Holland, which happens to contain more than its fair share of bikes, dykes and level crossings, Key Markets recently opened an out-of-town supermarket that is very reminiscent of France.

It opened in October 1979 on an industrial wasteland between a sugar beet factory and a sewerage works on the outskirts of Spalding, Lincs. It was the UK's first fully-computerised supermarket and the computer contract went to IBM.

The points of sale are designed to accept both bar coded and non-barcoded goods, so they are able to cope with a huge range of products from wheelbarrows to chewing gum. In addition, they are able to read both the US UPC and the European style of bar code which is essential during this transition stage because some US products such as soft drinks arrive bar coded. The bar code in those cases has been incorporated in the layout of the labelling on the package. The products which arrive without bar codes but which would be suitable for bar coding are, at the moment, in the majority.

Key Markets manages with the shortened UPC bar code, and so each item has a 6-digit UPC label stuck to it before it is placed on the shelves.

The 6-digit codes provide enough details to produce a customer receipt like the one shown in Figure 1, complete with its excruciating US valediction.

```
KEY MARKETS

        WHITE EGGS 2   .33½
TOTAL                  .33½

CSH TEND               5.00

CHANGE DUE             4.66½

11/03/80 16:02  0486/ 2
HAVE A NICE DAY
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Figure 1.

The process for checking them out is to slide the bar coded goods one at a time across the scanner as shown in the photograph. Each successful slide is followed by an audible bleep to confirm to the cashier that the bar code has been understood by the terminal.

Simultaneously, a clear display of the goods that have been purchased, with prices, appears for all to see on a marching display. The picture, (above, right) shows that part of the unit just above the cashier's head.

The scanner incorporates a laser for reading the bar codes and, as it is omni-directional, it can read a code even if it is only being pointed in the general direction of the laser. There is no need for the cashier to line up each item accurately with the laser. As a result, the throughput of each cashier should be much higher than if she had to follow the conventional procedure of keying the price of each item into a cash register.

The object of the installation is to decide whether to extend the investment to the other 124 stores in the group. David Agomber, general manager at Spalding, might be biased, but he is convinced that the information flow alone enables him to run a much more efficient shop. He is a grocer and is utterly committed to the computers.

The investment consists of 14 IBM 3663 terminals plus three other scanners and a terminal which uses price look-up, but does not scan, to handle tobacco sales. They are linked to an IBM 3660/B1 processor in the shop with another on standby.

The price file is maintained at Key Market's Hainault headquarters on its IBM 370/135 linked by leased Datel 1200 lines. Sales data is automatically transmitted to the host computer and so stock levels, cash sales and other returns are maintained and available on demand to Agomber.

The other major manufacturer of slot-scanning equipment suitable for supermarket use, is NCR. At the end of 1979 it is estimated that NCR had installed 3 EAN systems outside North America compared with IBM's 18.

But NCR can fairly claim that the numerous UK sales of its 255 price look-up systems can readily be enhanced with the new NCR T. 8255 controller, and other facilities, to provide a similar configuration to the IBM 3660 design.

For example, the NCR 255/T. 8255 systems provide store and check-out rates, auditing, departmental analysis and hourly activity. UK supermarkets with NCR 255 but, as yet, no slot scanning hardware in everyday use, although many are carrying out trials, include Asda, International Stores, Fine Fare and several Co-ops.

An alternative to Key Markets' approach is being explored by Fine Fare at its Hyde branch which is over twice the size of the Spalding shop and uses NCR hardware. Over 550 of its own-brand products are EAN coded at source with both bar codes and velocity codes.

A velocity code is a series of numbers that summarises the product line so that the computer can translate it into as detailed a receipt as the IBM one shown in Figure 1.

Ten of its fastest moving lines are not marked at all because cashiers remember what the various details are. As a result, only 1,300 lines are velocity coded at Hyde.

Clearly slot-scanning a bar code is superior to keying in each velocity code, but trials at Hyde show that the difference between the two approaches is not overwhelming.

For customers with up to 10 purchases the difference was very small; the advantage of slot scanning rose with the number of purchases until at 40 items per trolley, scanning was faster than any other scheme*.

International Stores has three branches which use either IBM or NCR hardware. All current installations require key entry codes and have varying degrees of price look-up. The two NCR branches have local NCR 726 minicomputers which are restricted to a maximum of 150 price look-up lines because that is the maximum that the NCR 726 processor can hold in its memory. It is planned, however, to overcome this limitation by installing disc storage. International Stores is planning to have 16 supermarkets equipped with computerised points of sale by 1982.

Sainsbury, the UK's second biggest chain, is experimenting at Crawley with velocity-coded goods using over 20 IBM 3660 terminals. As at Key Markets, there is an in-store processor with another on standby but the data is processed by IBM at Warwick. Bar coded scanning equipment is due to go live shortly to replace the velocity coded points of sale. By autumn, however, it is to be replaced by NCR 255 scanning equipment in order that a comparison between two types of equipment in the same store can be made. Not the sort of scientific comparison that some computer salesmen would relish!

Sainsbury, Key Markets and others have been particularly careful to earn and justify their customers' approval for the changes. They lay great emphasis on the need to demonstrate that there is no reduction in information being available to their consumer — it just gets produced at different stages.

All leading supermarket managers are nervous lest the experience of some of their US opposite numbers is repeated in the UK. In the US there have been distasteful confrontations in several States which has resulted in intense ill-feeling towards the whole idea of computerised retailing.

As a result, legislation has been introduced in some districts which requires old procedures, such as price labelling and bar coding of goods, to be continued. On the UK evidence to date there is no hint of any customer-led backlash developing, whether justified or not.

* Survey of point of sales systems. Institute of Grocery Distribution, 1980.

IN this second article on point of sale systems in the UK, Nicholas Benwell looks at firms which have either installed them or are thinking of doing so.

He discusses the merits of the IBM and NCR systems and points out that so far there has been no backlash against PoS systems in this country, unlike what has happened in the US.

Benwell is a lecturer at Cranfield Institute of Technology.

● Above is one of the point of sale terminals installed at Key Markets' Spalding store. Above the cashier's head is the screen that gives a marching display of goods bought with prices.

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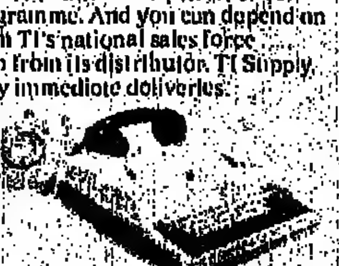

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ADVANCED FILE DESIGN — Part 11

by Owen Hanson and Norman Revell

STRUCTURES FOR DATABASES

IN Part 10 we saw how the choice of a logical data model and database management system (DBMS) determined the choice of file organisation. In general, the closer the physical storage organisation can mirror the logical data structure and processing then the better the performance of the database. In this part we shall explore the physical database organisation further by studying examples of some actual DBMS.

Inverted files for database systems

The concept of an inverted file was discussed in Basic File Design. If a file is fully inverted then it is possible to access that file using any of its data fields as a secondary key. Diagram 1 shows the simple motor car database both before and after inversion.

In practice if DASD are being used then access to the file could be provided via secondary indices as shown in Diagram 2. Also it may not be necessary to access the file via every one of its data fields, so indices are only constructed for those fields by which it is necessary to reference the file. This is known as partial inversion.

An inverted file, or set of linked files can thus form the basis of a DBMS, permitting access to the database via any specified key, provided an index has been constructed.

However, from a performance point of view there are three major drawbacks. Firstly that all relevant indices would need updating whenever a record is added to the file; secondly, that efficient batch processing is only possible in the sequence of the original file (s); and finally that at least two references are required for each record, one to the index and one to the file itself.

However, for query-type database systems this structure can work effectively and forms the basis of several DBMSs such as Adabas and System 2000. A simple example of such a DBMS is the Cromemco DBMS package designed to run on the Cromemco range of microcomputers.

This is a single user single file database system. Records are added serially to the database, and indices are maintained for designated datafields (known as sort-fields).

These indices are maintained in sequence, as in Diagram 2, so that every addition to the database causes indices to be resequenced.

The overheads caused by this constant updating of index files are quite acceptable in the personal computing environment for which this DBMS is designed, but would be less acceptable for larger scale use.

This type of structure, often in indexed sequential form with secondary key indices forms the basis for some of the smaller scale minicomputer DBMSs as well as the mainframe DBMSs previously mentioned. It is possible to support a network data model by providing links between the indices of different files.

An IMS database

As mentioned in Part 10, IBM's Information Management System (IMS) is based on a hierarchical data model and offers users a choice of physical file organisation to suit their processing needs. The IMS packages consist of both a data communications system and a database system; though it is only the latter that concerns us here.

The building blocks of an IMS database are known as segments. Each segment may comprise one or more datafields, the highest level being known as the root segment.

In the simple example we have chosen, the root segment would be the car-model and the engine segment would be a child segment of the root segment (also a parent segment) in the parent-child structure outlined in Part 10.

There are four physical file organisation methods possible for an IMS data base:

HSAM, Hierarchical Sequential Access Method.
HISAM, Hierarchical Indexed Sequential Access Method.
HDAM, Hierarchical Direct Access Method.
HIDAM, Hierarchical Indexed Direct Access Method.

We shall examine each of these in turn.

HSAM stores the database as sequential fixed length records, each record comprising a root segment and as many subordinate segments as can be accommodated, overflow segments occupying the next physical record(s). Thus in our example there would be three records, one of each root segment of Fiesta, Escort, Cortina, and the engine segments would be part of their respective parent records. This method is suitable only for batch processing of the database using either magnetic tape or DASD.

HISAM stores the root segment and as many lower level segments as possible (remaining segments being held in overflow) as ISAM records, thus it is possible to access a given root segment at random via its key and thence gain access to the lower level segments.

HDAM stores all the segments separately as a chained direct file, with pointers between levels in the hierarchy and between segments at the same level. Diagram 3 illustrates how the car example might appear using HDAM. There is no significance in the physical position of segments, since they are connected via pointers, though to minimise seek times it is advantageous to place segments which are normally accessed together physically close to each other. The root segment is accessed via a randomising algorithm.

HIDAM is similar to HDAM but uses an ISAM file as an index to the root segment and thence to lower level segments by chaining.

Both HDAM and HIDAM may take more storage space since each segment has its associated pointers stored with it. However, the ability to access individual segments makes them suitable for online use where rapid response to transactions is required.

HISAM and HSAM are more suitable for an environment where there are more batch-type applications and few if any query-type transactions.

It is interesting to note that in the early versions of IMS, IBM was aware of the shortcomings of ISAM and used a special access method (OSAM) to handle overflow and also to form a basis for the segment chaining used in HDAM and HIDAM. IMS/VS now uses VSAM, referred to in earlier parts, as a basis for HISAM, HDAM and HIDAM.

From a file design point of view IMS illustrates well the two stages of performance optimisation needed in a database environment once a DBMS has been chosen. They are:

1. Selection of appropriate physical file organisations from those supported by the DBMS — if there is a choice.
2. Optimisation of individual files by those techniques available for single files, as dealt with in previous parts in this series.

Space does not permit us here to study in detail a network or relational database system. In the case of the former, because of the more complex data model there may be an even greater overhead associated with chaining than with IMS, though IMS will now support more complex structures than simple hierarchies through use of the logical parent and logical twin concepts.

Of particular interest to the reader interested in further study might be the IDMS package which uses the Codasyl data model and is available on a wide range of computers, including ICL's 2900 series, in which the physical database is constructed using a page concept.

In the case of the relational data model, no DBMS is yet in use on a wide scale which is suitable for large scale commercial applications — a major problem here being one of performance, though it is possible that new storage technologies will facilitate the development of efficient relation DBMSs and that IBM's long-heralded System "R" will be launched.

REFERENCE
1. IMS General Information Manual GH20-0765, IBM.

BASIC FILE DESIGN
A new impression of Basic File Design is now available and copies may be ordered from the General Sales Manager, IPC Electrical and Electronic Press Ltd, Dorset House, Stamford Street, London SE1 9LU. Price £1.90 each including postage.

Product	Model	Engine
1	Fiesta	900cc
2	Fiesta	1100cc
3	Escort	1100cc
4	Escort	1300cc
5	Cortina	1300cc
6	Cortina	1600cc

Keyfield

Inversion →

Attribute	Product	
Fiesta	1	2
Escort	3	4
Cortina	5	6
900cc	1	
1100cc	2	3
1300cc	4	5
1600cc	6	

Inverted keyfield

Diagram 1. A simple inverted file.

Model	Index	
Fiesta	1	2
Escort	3	4
Cortina	5	6

Engine	Index	
900cc	1	
1100cc	2	3
1300cc	4	5
1600cc	6	

1	Fiesta	900cc
2	Fiesta	1100cc
3	Escort	1100cc
4	Escort	1300cc
5	Cortina	1300cc
6	Cortina	1600cc

Diagram 2. Use of indices for inversion.

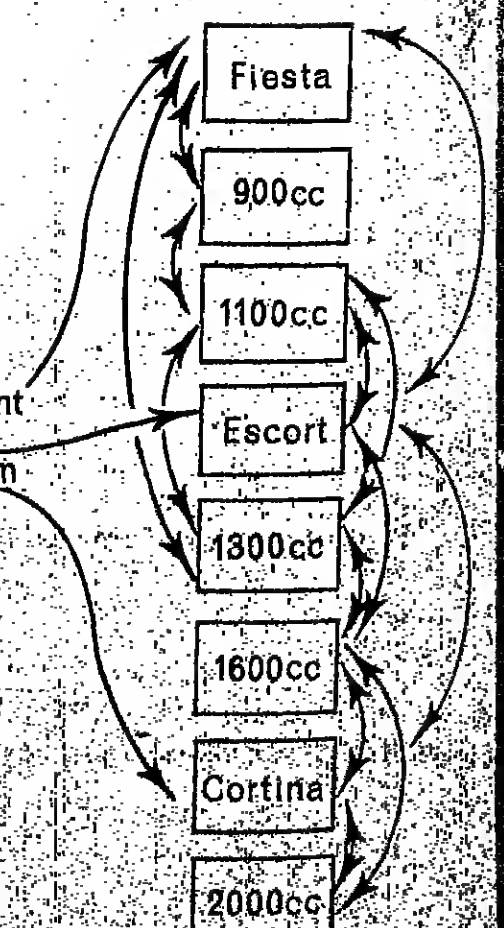
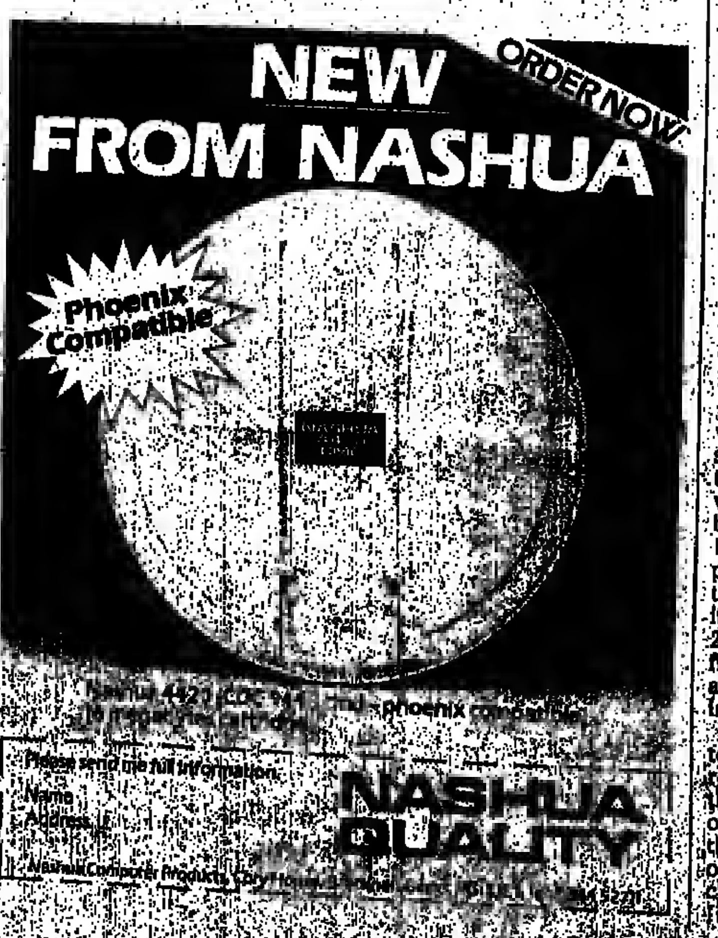


Diagram 3. HDAM database.



Foreign exchange system links into Swift

MERCHANT bank Morgan Grenfell has developed a real time foreign exchange system on its ICL 2960 mainframes which communicates with the Swift Interbank funds transfer network in a similar way to the Direct Swift Link on IBM mainframes. As a result, the ICL 1500 Swift Interface Device proved unsuitable to link to the network, and a General Automation 16-460 minicomputer was chosen instead.

"The mainframe system polls the terminals, but a 1500 with a keystation is itself a polling device, and this can cause contention. We found that a software solution to resolve this would be more expensive than the GA solution," Morgan Grenfell DP manager A. R. Gibson told Computer Weekly.

The 2960s will use ICL's XBM protocol to link to the GA 16-460, and thence via a GA SID to the Swift network. The 16/460 can take over the role of the SID in the event of failure, and will also be used as a message switch.

One 2960 is currently running the live system under DME while the other is running VME/B for development. The first live batch VME system is due in mid-summer, and the full live TP system is set for early 1981, when the 2960s will be run as a dual four-megabyte system under VME/B.

ICL chairman Philip Chappell is vice-chairman of Morgan Grenfell Holdings, but Mr Gibson told Computer Weekly that relationships with ICL were strictly at arm's length. "We do not use the connection to get better treatment from ICL and we are under no unusual pressure to buy from ICL," he said.

MEMOREX has installed an IBM 370/145 at its Staines customer engineering centre. It will be running under VM and OSVS/1 and will be used for bench marking and customer applications.

The firm hopes that, with systems testing extended to all subsystems delivered by it, downtime will be reduced.

Our picture shows Memorex tape drives for an IBM 4300 installation being checked prior to delivery at the 40,000 square foot centre. The firm also has 11,000 square feet of offices in a preserved Georgian building at Staines.

IBM aids for PSS packet network

TWO products have been released by IBM in the UK to aid user attachment to British Telecom's PSS packet network. They have been in service for two years in Canada for use with the Datapac, which was the first national packet network to use the X25 protocol, and have also already been announced in France, West Germany and Holland.

One of the products is an extension to the SNA software which runs in IBM 3705 communications controllers and the other is a hardware Network Interface Adapter which sits at the other end of the line to a 3705, or both ends of a non-SNA link.

First deliveries are planned for June 1981. The NLA costs £3,278 each or £93.30 a month.

Call for papers

A CALL for papers has been announced for the fifth annual microprocessor workshop on microprocessor applications to be held on September 1 and 2 at Liverpool University's Computer Laboratory.

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3. RPGII £7,500
Buckingham-based, small team require Programmer with minimum of one year's RPGII experience.

4. Senior Programmer £8,000 + Bonus
Berkshire firm require several years' of PL/1 experience for new real-time and database systems.

5. PL/1 Programmers £8,500
North London-based firm requires good PL/1 experience to work on Real-Time telecommunications systems.

6. OS/VS1 Cobol To £10,000
Croydon-based firm seeks Cobol Programmers at all levels to assist in development of large Real-Time Systems

7. Assembler Programmer To £10,000
South London-based firm required minimum 2 years' experience of OS Assembler for T.P. Systems.

8. DOS/VS Cobol £7,500
South Coast-based firm seeks Cobol Programmers at all levels for development of future IBM 4341. CW51/

Irish Assignments

£7,000+
1. **Co MAYO** based manufacturing company require RPGII Programmers.

£9,500
2. **DUBLIN** South company seeks Systems/Analyst with commercial background.

£10,000+
3. **CORK** based Co. requires D.P. Manager for IBM 360 with manufacturing experience.

£8,500
4. **LIMERICK** Electronics firm requires Programmer/Analysts with RPGII exp.

To £8,000
5. **DUBLIN** Software House seeks Programmers with DEC experience.

£7,500+
6. **SLIGO** based company requires RPGII Programmers/Analysts.

c£10,000
7. **DUBLIN** based Electronics Company requires Systems/Analysts with COBOL and manufacturing experience.

Please apply to Gerald Delamere at CCC at Canberra House, 24 Lower Leeson Street, Dublin 2. Tel. Dublin 789577. CW57/

Overseas Assignments

1. GERMANY DM 60,000+
German speaking candidates with experience of mini software or micro systems.

2. HOLLAND £ Neg.
Systems programmers with PDP experience for Real Time Telephony systems.

3. GERMANY DM 60,000+
IBM DOS/VS Systems Programmers for Hamburg and Munich.

4. FRANCE Fr 160,000
IBM Systems Programmers with big machine experience MVS, VM for large IBM Network.

5. SWITZERLAND SFR 55,000
Software Engineers with experience of process control to work on Power Stations systems.

6. SWITZERLAND SFR 55,000
German speaking Technical Writer, to work on Documentation for Real Time telecomms project.

7. GREECE Dr 35,000 p.m.
Fluent Greek required for Programmer with COBOL experience to work on commercial mini based systems.

8. SWITZERLAND SFR 80,000
IBM Systems Programmer with experience of OS/VS1, CICS and pref. DL/1 for joint responsibility on an IBM 3031. CW55/

IBM Systems Programmers

1. DOS/VM Systems Programmer £9,500+
City based, to take full responsibility of systems programming with the arrival of 4341 next year.

2. OS/MVS Expertise £10,000+
Sussex based, several years' experience required for consultancy role.

3. OS/VS1 £9,000 + Mortgage
City based, 2/3 years' experience of OS plus VM/370 and CICS pref. DEC Network.

4. Real Time Programmer £8,500
Croydon based firm seeks ASSEMBLER experience for Database and communications projects.

5. Systems Programmers £ Neg. + Mortgage
London based Insurance Co. 2 years' experience of Operating systems MVS, TSO, VTAM, etc.

6. MVS Systems Programmers £12,000
London based consultancy requires experienced Systems Programmers for U.K. and overseas assignments.

7. HAMBURG — Systems Programmer DM 60,000+
370/138, DOS/VS, CICS, Company requires Systems Prog. to take over the full function. CW56/

Central Computing Consultants
8 Lower Grosvenor Place, London SW1 Telex 918582
01-834 7105 CCC

Name
Address
Phone: Home Office
Position applied for: Ref.
Central Computer Consultants
Freepost, London SW1W 0BR

COMPLETE SYSTEMS DEVELOPMENT

Leicester Building Society

★ **NEW REAL-TIME SYSTEMS TO BE RUN ON DUAL BURROUGHS B7800 MAINFRAMES**

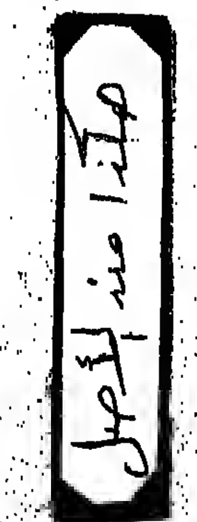
★ **ON-LINE DATA COMMUNICATIONS NETWORK OF 250 TERMINALS AND EXPANDING**

★ **NEW PURPOSE DESIGNED COMPUTER CENTRE NEARING COMPLETION**

One of the UK's "Top Ten" building societies, the Leicester, can now offer challenging careers to three further computer professionals who seek to exercise and expand their skills in a large development programme. These posts will be based at the Chief Office in Oadby, a pleasant residential area on the outskirts of the City of Leicester.

DATABASE TECHNICIAN
Salary circa £8,500

Ideally candidates will have Burroughs Large Systems DMS2 experience. However, if you have a sound technical background and practical database experience, we would still like to hear from you. Work will include instruction and creation of database standards for programmers; also interface with the systems team in designing database and data dictionary.



SYSTEMS ANALYSTS
Salary circa £7,500

Applicants, ideally aged 22-29, will need a minimum of one year's on-line systems analysis and design experience, together with a strong programming background.
The four major project areas under way include financial control; investments; mortgages; and agency commission system. A management information system will also be developed.

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For further details, contact MARK OGDEN on 021-643 8501, reversing charges. Please quote ref. MO/273/CT25/06.

I am interested in vacancies at Leicester Building Society.
Name
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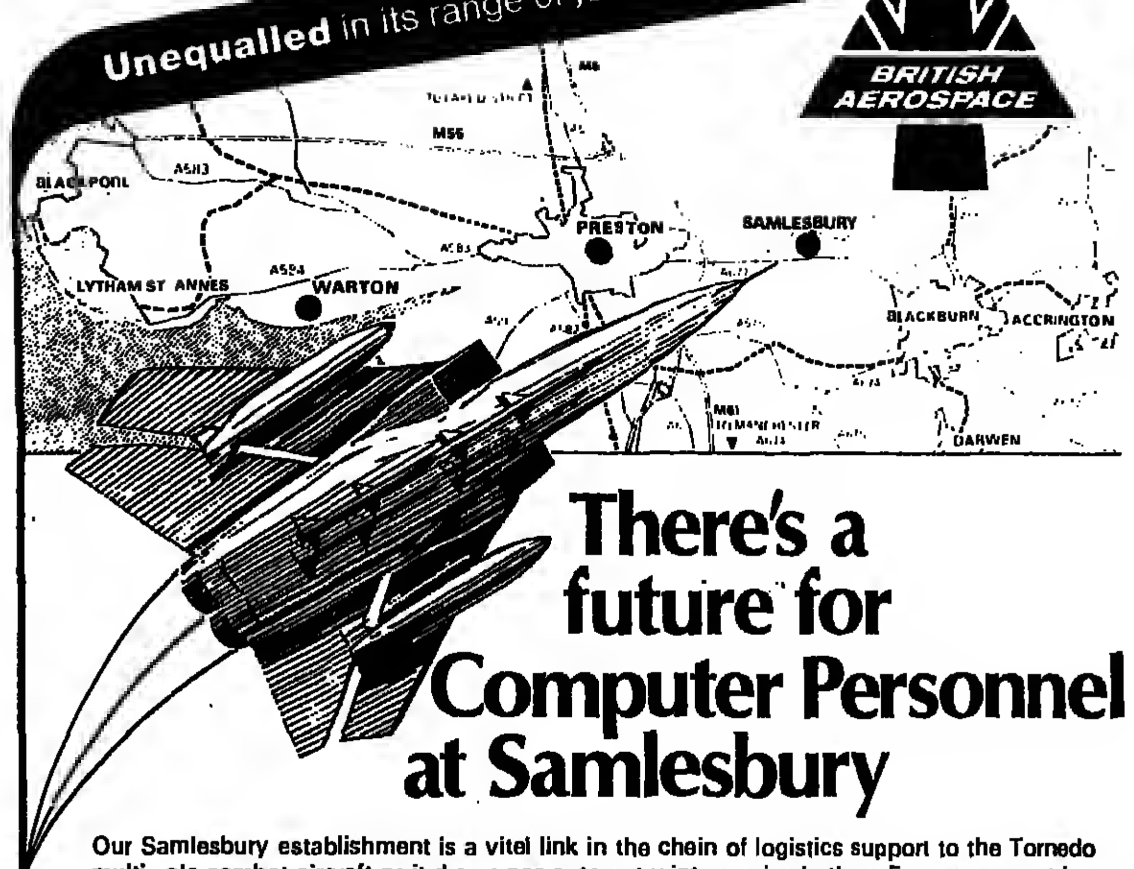

There's a future for Computer Personnel at Samlesbury

Our Samlesbury establishment is a vital link in the chain of logistics support to the Tornado multi-role combat aircraft as it draws nearer to entry into service in three European countries. Samlesbury, the Warton Division's fastest growing site, is in a pleasant rural location between Preston and Blackburn. Our immediate requirements include:

Programming Team Leader
to control the activities of a group of programmers working on a variety of Spares Supply Systems. The successful candidate must be capable of contributing to the development of effective systems designs and will be responsible for the maintenance of appropriate standards. Applicants should be qualified to HND/Degree level and have at least 7 years' programming experience, some of which must have been in an IBM 370 environment. Good working knowledge of COBOL is essential, and knowledge of CICS/DLI would be an advantage.

Senior Analysts/Analysts
To work on the development and support of a variety of Spares Supply Systems. Applicants should be qualified to HND/Degree level, and have a minimum of 2 years' experience in a commercial environment.

Senior Programmers/Programmers
with a minimum of 2 years' COBOL experience, ideally in an IBM 370/OS environment. Applicants should preferably be qualified to HND/Degree level, and knowledge of CICS/DLI would be advantageous.

For an application form, please telephone or send the coupon below to:
Personnel Manager (Recruitment), British Aerospace Aircraft Group, Warton Division, Samlesbury Aerodrome, Balderstone, Blackburn, Lancs. BB2 7LF
Tel: Mellor 2371 Ext. 327

Please send me an application form.
I am interested in your vacancies for........
Name........
Address........
Ref: 1/80/CW

BRITISH AEROSPACE AIRCRAFT GROUP Warton Division

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New projects starting in Surrey, Berks & Hants.
Software designers & programmers needed.
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UNIVERSITY OF SURREY
Computing Unit

SYSTEMS SUPERVISOR — SRC MULTI-USER MINI

A Systems Supervisor is required to manage and control the SRC Multi User Mini (Prime 550) recently installed in the Computing Unit at the University in Surrey. This processor has been funded by the Science Research Council (SRC) and is specifically for the use of SRC grant holders. The successful applicant will, as well as managing the system, be expected to work directly with the SRC grant holders and assist with the definition and implementation of their software requirements. Enthusiasm and ability to work with others is essential and applicants should be experienced in both system and application software with a scientific bias. Knowledge of Fortran is expected.

This post is offered on a 3-year basis on salary scale 1A £5,062-£8,781. Salary scale 2 (£8,427-£10,488) will be considered for exceptional applicants.

Applications including a curriculum vitae and the names and addresses of 2 referees should be sent to the Deputy Secretary (Personnel), University of Surrey, Guildford, Surrey GU2 5XH or telephone Guildford 71281 ext. 417 for further information. (1758)

EUROPEAN MOLECULAR BIOLOGY LABORATORY

EMBL invites applications for a vacancy at its Heidelberg laboratory as

HEAD OF COMPUTING

The successful applicant will have overall responsibility for the organisation and coordination of operation, user support and new applications of a multi-user computer facility, specialised for laboratory data acquisition, image processing, interactive graphics and scientific data processing. The present configuration comprising 4 Nord 10 minicomputers will be expanded by a medium-size machine in the future. The salary offered will be not less than DM 4200 monthly, after tax, plus certain allowances. An initial contract of 3 years will be offered.

Applicants with a university degree in computer science or a related discipline, together with several years of relevant experience, should write, quoting reference 80/14.to:

Sir John Kendrew, Director General, EMBL, Postfach 10.2209, D—6900 Heidelberg, Germany. (1748)

Recruitment LOGISTIX In Informatics

Network Project Leaders
Greater London: Salary to £12K

A well-known European Systems Supplier and Consultancy with a recently established U.K. subsidiary is seeking several Project Leaders with extensive experience of data communications and networks in a banking or other financially orientated environment. Successful candidates will preferably be graduates and aged 27-34 years. You should have a minimum of five years' programming and/or financial applications consultancy experience, gained in either a commercial, merchant banking, stockbroking or investment orientated environment. Our clients would prefer those who have current experience in an installation having extensive mainframe and minicomputer capabilities in an on-line mode. Multi-tasking and fail-safe computing techniques are particularly valued skills and will reflect in the salary offered.

Ref: L/20/A

IBM & Amdahl Systems Engineers
Germany & Switzerland: Salary £22K

We have rare opportunities for Senior Systems Engineers and Project Managers for permanent career positions in Rhineland Germany, Bavaria and Switzerland. Technically, you must demonstrate continuous exposure to the implementation or support of Data-Base and Teleprocessing systems. It is a pre-requisite to offer "hands-on" Software experience with IMS/DB-DC; CICS/VS; MVS or with the D.B. or T.P. Software of an independent supplier. The Company offers higher than average salaries (even by Continental standards) plus a range of extensive and practical benefits. Interviews can be arranged to suit individual requirements.

Ref: L/28/B

Communications Programmers + Engineers
W. Country : Salary to £11K

One of Europe's renowned communications companies, with a well-established and expanding MicroProducts Group, urgently requires dedicated real-time professionals for its software "workshop". The Company is based in an area of outstanding natural beauty which can offer reasonably priced housing to those wishing to relocate. Currently, you should be employed as a Software or Development Programmer/Engineer and have 2-3 years' minicomputer or microprocessor Assembler experience. It is a distinct advantage to offer a numerate degree combined with extensive knowledge of at least one high level Programming language. Involvement with Intel 8085/6 or Zilog Z-80 micro-processors will be particularly advantageous but candidates with a background in real-time military or defence applications are equally encouraged to apply. These exceptional positions require liaison with both internal and external customers and well-developed personal communications skills are, therefore, essential. Interviews can be arranged locally or in London.

Ref: L/28/C

Project Leader - Telecomms
Paris : Salary to £18K + benefits

Due to the planned expansion of its distributed processing network a "blue chip" multi-national requires a French-speaking Project Leader for its Paris-based installation. Candidates will be required to have at least 5 years' communications software experience and demonstrate the ability to lead a Project Team engaged in the development of non-homogeneous networks. The configuration consists of Honeywell-Bull minis on-line to an IBM mainframe. As well as having responsibility for the design and development of a full communications system, the successful applicant will have the additional opportunity to assist in the evaluation and selection of new computing facilities.

Ref: L/28/D

Software Instructors
Berks/Bucks: Salary to £10K

A leading manufacturer of mini-computers is seeking several Software Trainers for its U.K. Regional Headquarters. Work content will include the staff training of both existing and prospective customers in general d.p. techniques and the individual requirements and capabilities of the company's software. Education currently takes the form of product demonstrations, seminars, workshops and, of course, inevitable "on-the-job" learning. The development of software courses in areas not so far covered by the company will form an essential and integral part of the position. The company has a stated preference for candidates who can combine previous FORTRAN and/or ASSEMBLER programming in a practical environment with past or current experience as a Software Lecturer or Trainer in an academic or manufacturing environment.

Ref: L/28/E

Scientific Programmers
West Germany: Salary to £18K

A Scandinavian Systems Supplier is further expanding its team numbers in the areas of Image Processing, Operational Research, Modelling and Graphics. It is an essential requirement for these vacancies that all Applications Programmers offer both in-depth FORTRAN and ASSEMBLER Programming experience in a mini-computer environment. Systems Programmers who can offer experience in the development and implementation of compilers and operating systems are also encouraged to apply. There will be future opportunities to work for the Company in other Continental European locations.

Ref: L/28/F
(1703)

Logistix, 10 Grenville Place London SW7 4RW

01-373 3063 LOGISTIX **Telex: 28800**

MANAGEMENT & EXECUTIVE SELECTION

telephone 01-637 9611

European General Manager

London based

American mini computer manufacturer

We have been retained to identify and select a European general manager by our client who is one of the most exciting computer manufacturers to emerge within recent years.

Having successfully established their operations in the USA they have now decided to release their outstanding products to distributors in Western Europe.

Candidates will be responsible for the formulation and implementation of a European business strategy that will include the selection and development of a dealer network.

Remuneration will be in the form of an extremely attractive basic salary + 1% over-ride on total European sale with no upper limit + executive car and the usual company fringe benefits.

Contact Tony McGrath on 01-637 9611

Suite 201/6 Albany House 324 Regent Street London W1R 5AA 01-637 9611

MANAGEMENT & EXECUTIVE SELECTION (1733)

Cambridge

Analyst/Programmer

circa £6k plus car

A Cambridge Systems House rapidly establishing itself as a leader in computer technology is about to embark on an ambitious development project. This employs the latest hardware and sophisticated DB/DC techniques for which a comprehensive training programme will be provided.

This has created a requirement for an additional Analyst Programmer. The ideal candidate will be educated to degree standard and have a minimum of two years programming experience using COBOL.

[illegible]

Computer People London

[illegible]

UNIVERSITY OF EDINBURGH
EDINBURGH REGIONAL COMPUTING CENTRE

MICROCOMPUTER SUPPORT POSTS

The centre provides a wide range of Computing Services to users in the University and Research Councils in the Edinburgh area. In response to recent developments in distributed computing, the centre has established a microcomputer support unit within its user support services division.

Applications are invited for three posts in the microcomputer support unit. Those appointed will join a small, energetic team working on a range of personal computers. Current work involves the UCSD-Pascal System and Communications to the Edinburgh network. These are the basic tools on which the University's micro support strategy will develop. There will be ample opportunity for initiative and participation in exciting developments in University Computing.

Three specific functions have been identified for which applications are invited from graduates with computing experience for the computing officer posts, and from persons with an HNC or equivalent for the computing assistant post.

MICROSYSTEMS REQUIREMENTS ANALYST (CO2/3 £5052-£10484)

MICROSYSTEMS PROGRAMMER & ADVISER (For Distributed Systems) (CO1/2 £4402/£8786)

COMPUTING ASSISTANT (CN2/3 £2816-£4200)

For further details and an application form please write (quoting Ref. 8087) to the Secretary, University of Edinburgh, Old College, South Bridge, Edinburgh 8, to whom applications should be returned by 28th July, 1980. (1755)

COMPUTER OPERATOR

UNIVERSITY OF LEICESTER

X-Ray Astronomy Group

A vacancy exists for a Computer Operator to assist with the computer operations in the ... Data Terminal. Some experience of operations with DEC PDP ... would be an advantage ... [illegible]

TALAIR Tourist Airlines of Niugini

ANALYST / PROGRAMMER (SOUTH PACIFIC)

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Talair is one of the largest third level airlines in the world and operates an ICL 2903. An ME29 is currently on order.

We are looking for an Analyst / Programmer with a minimum of 2-3 years RPG2 experience (2903 and on-line experience helpful but not essential)

If you are interested, and fit these requirements please send a DETAILED personal and career history to: MR G GOOLD, 50 BROAD STREET, LECKWITH, CARDIFF.

Interviews will be held in London at the end of July. The successful applicant should be prepared to be in Papua New Guinea by early October.

A BETTER LINE OF COMMUNICATION

Due to a period of sustained growth and the introduction of new generations of data communications equipment from our principals including CODEX intelligent network processors, Micro-Systems, Front-end processors, opportunities are now arising at our Croydon office.

SYSTEMS ENGINEERING

SYSTEMS PROGRAMMER

Ideally the successful applicant will have had previous experience in systems programming and preferably IBM Mainframes. Hatch and Interactive Communications and Interfacing Plug Compatible Manufactured Products with IBM equipment.

Responsibilities will include:—

Definition of Customer requirements, preparation of proposed systems Generation, Installation and Debugging. Customer Software Support and Operator Training.

SYSTEMS ENGINEERS

This post requires a person with experience of Data Communication Networks, defining systems both as user and in a sales environment. Large proposal preparation and presentation to customers.

Responsibilities will include:—

Systems definitions, formulation of proposals, sales training, customer presentations and large system checkouts.

TRAINEE SYSTEMS ENGINEERS

The Company would be interested to hear from Graduates and Engineers who have had experience in the Data Communication and Computer Peripheral Industry and would be interested in establishing a career in data communication system engineering.

An attractive salary package will be offered with the additional benefit of a Company car.

Other benefits available:-

Free life assurance and Income Continuance Plan, non-contributory pension schemes, free B.U.P.A. Membership, 4 weeks annual holiday, some assistance can be given with relocation expenses.

If you would like to apply for one of the above positions please write or telephone in the first instance for an application form to Miss S. J. Sewerin, Personnel.

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(1682)

Designers Hardware & Software

London & W. Country — £6K – £11K

Join a highly qualified existing team working on ambitious project developments in electronic office systems. These are permanent positions in a prestigious company. Projects cover: Networking and comms; graphics – intelligent work stations interface design, etc.

IBM Systems Programmer

Sweden — £ generous

You should be young, (25ish) enthusiastic and gregarious. Our client requires a Technical Product Support specialist to cover locations in Sweden. Product training given; relocation self (and family); up to 2 years in Sweden, longer if wanted. Permanent position with company in N. Berks.

Mini – Micro Systems Company

S. E. Berks — £ Neg

* Software Designers – BCPL
* Applications Support – Fortran
* Customer Reps – Intelligence
* Field Engineers – Experience

This is a small, successful company with a go-head, dynamic management team. They provide the best pay and conditions for the best people. D.G. minis and 16 bit micros for the next product development.

Computer Services Manager

S. Herts — £8K – £10K

An operations services department, within a large minicomputer manufacturing company, requires a hardware services manager to be responsible for the control, availability and maintenance of computer systems used by software and hardware development engineers. There are 15 systems in two locations. You will act as deputy to the Services Manager. Relocation if required.

Micro Programmers — Berkhamsted c. £8,000

Real-Time Pascal Prog. — Bourne End c. £8,000+

Project Leader Micro S/W — Beds to £10,000

Apply in confidence to Terry Harvey by sending personal and career details, or contact him for an application form, evenings Gt. Missenden (02406) 4705 or daytime as below.

HR Harvey Recruitment
Executive and Computing Personnel Consultants
500 Chesham House, 150 Regent Street, London W1R 5FA. Tel: 01-734 5351 (1731)

JBA

Database Development

Belgium — **to c. £30,000**

One of the most highly respected Consultancy organisations in the U.K. is currently running a major database development project in Belgium, for which two Senior Consultants are required as follows:

Database Administrator

A thorough technical background is required for this position, with particular emphasis on such CODASYL databases as IDMS. Naturally, direct DBA/design experience is the most applicable at this level.

Database Designer/Analyst

Again, sound technical experience is required but with more emphasis on the analysis design aspect. Full data analysis experience would be a major bonus, as would intricate knowledge of large IBM installations and a financial system background.

The project is long-term and likely to grow in scope and size. Therefore, a willingness to move to Belgium on a permanent basis – although not an absolute requirement – would be extremely useful. Career opportunities and financial rewards are both exceptional.

Contact: Andy Wright

IMS Database Administrator

Scandinavia — **to £30,000**

A London based Consultancy, of the highest repute in its field, currently has an extremely challenging assignment in one of the major Scandinavian cities for an experienced Project Leader or Senior Analyst with extensive IMS experience. The appointee will establish the Database Administration role for a large organisation which is going to be switching to a fully IMS db/dc system, in conjunction with other senior members of the Consultancy, who will be carrying out other analysis, design and project management functions.

Our client will consider candidates only if they possess the requisite technical background, and candidates can be assured that the above assignment would only be the first of many in the database field.

Contact: Andy Wright

Systems Programmers

City Based — **c. £9,500**

An international management consultancy are in the process of developing and marketing a range of applications software for mini-based systems, and need experienced people to join their highly professional team.

A minimum of 2 years experience of minicomputer applications with a preference for DIBOL and BASIC languages. The ability to communicate with people at all levels is desirable.

The organisation believes in career development and therefore, candidates with the right skills and background would have every opportunity to progress. **Contact: Janet Chilvers**

Senior Systems Analyst

West London — **Neg. to £9,000 + car**

A vacancy exists with a mini computer manufacturer for an experienced Analyst, used to working on a variety of commercial business systems, to join a small but highly effective team. The work involves the translation of customer requirements into systems definition, design, and the subsequent implementation of the finished system.

The successful appointee will have sound analytical skills, be able to demonstrate a working knowledge of on-line systems; and have a broad understanding of most facets of business systems development. Written and oral communication is of paramount importance. Excellent career prospects. **Contact: Margaret Stevens**

Data Processing Manager

Hampshire — **c. £8,500**

The continuing expansion of the U.K. branch of this aggressive and highly successful international marketing and distribution company, has led to an urgent need to establish an in-house d.p. service. A System 34 has therefore been ordered and is due for installation within the next few months, but since no d.p. expertise exists in the company at all, a Senior Analyst/Programmer is required to set up and run the site.

Candidates must have extensive System 34 experience and be completely fluent in RPG II. The ability to initiate, develop and implement new systems is essential and an out-going and communicative personality will be sought. **Contact: Andy Wright**

Analyst/Programmers

London, EC2 — **up to £8,500**

A very successful international organisation wishes to recruit several ANALYST/PROGRAMMERS to work in small teams to develop commercial on-line applications on an HP 3000.

Candidates should have three years programming experience together with some involvement in the design of systems. A background of minicomputers is obviously desirable but not mandatory as training will be given where appropriate. Interesting and friendly environment. **Contact: Jim Baker**

COBOL Programmers and Senior Programmers

Gloucs. — **£6,000 – £8,000**

A number of positions are available for programmers with from 1 to 4 years COBOL experience to join our client's new team, developing and redesigning their manufacturing and reporting systems on a new HP3000.

Applicants for senior positions, i.e. 3 years +, are expected to possess on-line systems experience and be fluent and effective in spec. writing. A knowledge of structured programming would be a marked advantage and candidates should have good management potential.

A relocation package is available for those wishing to move to this beautiful part of the country, plus all the normal large company benefits. **Contact: Brian Postles**

Graduates – Micro Systems

Cambridge — **c. £5,000 +**

A small but rapidly growing development group have entered the second phase of a word-processor system project and require additional design people. The current work involves the communications ring network, utilising portable software.

Candidates must be totally computer orientated and conversant with languages such as BCPL, PASCAL, RTL2, etc. The ability to work in a team and take on responsibility is important, together with a natural creative drive. Excellent prospects for right candidates. **Contact: Brian Postles**

JAMES BAKER ASSOCIATES,
International Personnel Consultants,
32 Savile Row, London W1.
Tel: 01-439 9311.

(1730)

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Base Salary £8,000 plus
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Midlands

As one of the Largest Computer Manufacturers in the World, our Client has substantially increased their annual expansion and profitability in a highly competitive marketplace. This has been achieved by management and marketing techniques which have ensured the Company's position in the UK and Overseas.

Their success is not only attributed to a highly motivated and well rewarded sales force along with a support team who have considerable sales awareness, but a product range which caters for any level of computer user.

Having a manufacturing capability and a comprehensive branch network in the UK, our Client offers scope for individual skills and creativity within a flexible and dynamic management environment.

The requirement is for Sales Professionals who can demonstrate a successful sales track record in high volume computer systems.

Unlimited prospects for career advancement and product training are offered together with a high base salary and substantial guaranteed commission earnings.

Remuneration will not be a barrier to qualified candidates.

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021-308 4908 (evenings and weekends).

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Birmingham 021-236 3781 35-37 Great Charles Street, Queensway, Birmingham B3 3JY
Manchester 061-833 0427 Blackfriars House, The Parsonage, Manchester M3 2JA
Brussels 010 322-640 7151/71 Avenue Louise 327, Boite 4, 1050 Bruxelles

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3. Very good earnings, in the £6,000 to £10,000 bracket to start, according to experience.
4. Excellent scope to upgrade your experience — good training budget and the chance to work to sound professional standards.

We are recruiting on behalf of clients, a large West End installation. This opportunity will interest programmers with at least 1½ years' practical programming experience, including COBOL. Team leadership ability is required at the upper end of the salary range.

Ring us now for a confidential talk, quoting ref. 166CW, or leave a message on our answering machine after hours.

(1769)

EDP

EDP SYSTEMS 01.637 5796
52-53 Margaret St. London W1N 7FF

Computer Systems Engineers

Office of the future — W. Country.

Our client requires three experienced computer engineers to install integrated electronic office systems at pilot sites in the U.K. The heart of the system is a unique distributed intelligence processor. Candidates must be prepared to spend 4 to 6 months in California for training on this machine. Computer telecommns. and software knowledge are required. Your experience will be used to form a base of expertise in this attractive West Country location. Salaries c. £10,000.

Senior Micro Engineer

S. Bucks — to £9,000

Our client requires an experienced microprocessor engineer to join a micro systems section in their process control R & D centre. You will investigate, design and install new micro based applications throughout the company's plants in U.K. A mix of software and hardware skills is desirable. Suggested experience will be with Z80, 6800, 8080 or similar.

Micro Enthusiasts

W. Herts — c. £6,000

Bright, young qualified candidates are required to work as programmers and engineers on a world leading micro system. There are opportunities in support, marketing and engineering repair. Excellent ground floor positions.

Applications Development Trainee Programmers

C. London — £ generous

A large management consultancy is offering the opportunity for several candidates to develop their programming skills working on package development on IBM 5100, PDP 11/34 and Wang 2200 minis. You must have a degree or equivalent and the potential to develop within the company.

S/W Development Progs — Bedford £6K–£10K

S/W Tech Authors — Many locations to £9,000

Apply in confidence to Terry Harvey by sending personal and career details, or contact him for an application form, evenings Gt. Missenden (02406) 4705 or daytime as below.

HR **Harvey Recruitment**
Executive and Computing Personnel Consultants
500 Chesham House, 150 Regent Street,
London W1R 5FA. Tel: 01-734 5351

(1732)

EAST MIDLANDS

PROGRAMMERS ANALYSTS PROJECT LEADERS

Minimum 18 months — **Salaries to £8,000 p.a. and INDEX LINKED**

Our clients are a well established and highly professional computer services organisation. Operating both at home and abroad, they provide consultancy, support services, software products, and bureau facilities to external organisations.

Major expansion in the East Midlands has created a number of posts which offer very real career development.

You will have the opportunity to develop your skills at all levels in:

REAL-TIME MINICOMPUTER WORK
A WIDE RANGE OF FINANCIAL AND COMMERCIAL APPLICATIONS
SYSTEMS FROM FEASIBILITY TO IMPLEMENTATION
RPG II, COBOL AND ASSEMBLER

Current projects involve ICL, IBM, Small Business Systems and ebullient hardware as well as Microcomputers.

You should offer at least eighteen months' commercial experience. The particular hardware, language or systems are of minor importance.

Salary levels are excellent and INCREASE automatically with inflation. This area offers LOW COST HOUSING and where appropriate, assistance with relocation will be considered.

Male or female candidates should contact Patrick Convey quoting reference number CW 279.

CPC

COMPUTER PERSONNEL CONSULTANTS
18th Floor, The Rotunda
Birmingham B2 4PA
021-632 6848

CORAL ASSEMBLER

Real time mini projects in Berks, Hants, Surrey
Contract or Permanent
Crowthorne 77921 or 3370 day
Farnborough (Hants) 48083 eve./wknd.

UNIVERSITY OF LONDON GOLDSMITHS' COLLEGE
School of Science and Mathematics

TECHNICIAN GRADE 5

Applications are invited for the post of Technician Grade 5 in the Mathematics Department to maintain and supervise use of computer equipment and develop software for micro computer system. Knowledge of Basic and assembly language programming essential.

Required as soon as possible after 1st October, 1980.

Salary on scale £6,037 x 5 increments to £6,764 per annum inclusive of London Allowance.

Write for further details to the Personnel Officer, University of London Goldsmiths' College, New Cross, London SE14 6NW. Closing date for applications 11th July, 1980.

(1759)

UNIVERSITY OF ABERDEEN
COMPUTING CENTRE

ASSISTANT COMPUTER MANAGER

2900 VME/B TP COBOL PROGRAMMERS

Contracts in Kuwait, 6-12 months, approx. £18,500 p.a. package. Plus free fares and accommodation.

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01-240 2441
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SR. SYSTEMS ANALYSTS	**LONDON**	**to £10**
Must have developed one medium to large system		
CHIEF PROGRAMMER	**N. LONDON**	**to £**
2903/4 experience with COBOL and EXEC.		
SYSTEMS ANALYSTS	**LONDON**	**to £**
Be able to communicate at all levels.		
TRAINEE ANALYSTS	**LONDON**	**c.**
Senior Programmers or Programmer/ Analysts will be re-trained		
PROGRAMMERS	**LONDON**	**c.**
Two years' experience in Assembler or PL1.		
COBOL PROGRAMMERS	**LONDON & S.E.**	**to £**
18 months' min. COBOL experience, Jobs on Mainframes and Minis.		
SALESMAN	**BERKS. O.E.**	**£10,000+**
Sell hardware for an international company.		
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Well-educated, motivated people to work for major U.K. Co.		

FOR MORE INFORMATION ON THESE AND OTHER VACANCIES TELEPHONE

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Peter Barson or
Bill Taylor

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107 Jermyn Street, London SW1

FREELANCE OPPORTUNITIES CHECKLIST

Programmers PL/1 IMS DB/DC	**Programmers COBOL CICS**	**Programmers Honeywell Level 66 COBOL 74 COMMS**	**Programmers IBM OS COBOL**	**Programmers IBM Systems OS DOS**
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Rates up to £400 p.w. + expenses.
Prompt payment in a professional environment for first time or experienced freelancers.

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BOMARC

Computer Services Manager Speke

We are responsible for the UK manufacture of Glaxo Pharmaceuticals and their sale in this country.

The Company is engaged in the implementation of a large network of Hewlett-Packard HP 3000 mini-computers involving all Company locations and based around a large central ICL mainframe. There is a major development programme of advanced on-line systems being built around a distributed database, predominantly in the production planning and recording, inventory control and quality assurance areas

We wish to appoint a manager for the Speke installation which has two mini-computers, one of which is linked to the HP network and the other linked to a central ICL mainframe.

The successful candidate will manage a team of twelve people and must be able to demonstrate sound technical and operational capabilities and management judgement, and be able to establish good working relationships at all levels in an environment that will demand a high service level and personal commitment. The manager must be able to spearhead developments of significant importance to the Speke factory while also contributing to the Company programme of systems development. He or she will be expected personally to undertake systems analysis and have sound programming experience

Experience in an on-line environment and of manufacturing systems in a chemical or pharmaceutical industry would be an important advantage and recent management or supervisory experience is essential.

Attractive conditions of employment include profit sharing scheme, non-contributory pension scheme, and assistance with relocation where appropriate.

Please write for an application form to: Miss V. A. Waters, Personnel Officer, Glaxo Operations UK Ltd., Greenford Road, Greenford, Middx., or call 01-422 3434, ext. 340, quoting ref. FY. 115.

(1743)

GLAXO OPERATIONS

PDP PROGRAMMERS

Our Associated Company, Logsys Computer Services, is a Software House based in Berkshire, that specialises both in the provision of expertise for real-time and complex software projects, and in providing commercial systems, on PDP and VAX hardware. Specifically at the moment they require:

MACRO or CORAL — to £8,000 — S. OXON

Senior programmer for No. 2 position in real-time project. Ideally, applicants should have Device Driver design experience. Genuine opportunities to move onto VAX or into system design.

RTL2 — to £7,500 — EPSOM

Programmers to work on PDP 11, MTS real-time Radar processing project.

BASIC + — to £6,500 — CROWTHORNE

Experienced programmer for work on commercial systems both for first time and also more experienced users.

If you are considering a career move Logsys can genuinely offer progressive, challenging and satisfying work, excellent salaries + expenses, and a relaxed, informal but professional company attitude.

To discuss these permanent positions please telephone Mike Wilson on Crowthorne 77921 or 3370 (day) or Farnborough (Hants) 45083 (eve./wkend).

Computer & Management Personnel, 76 Little Britain, London, E.C.1.

COUNTY SURVEYOR'S DEPARTMENT

Invite applications for

Analyst/ Programmer

£5,973-£7,077 (review 1st July, 1980)

The Technical Services Group provides a support and development service to the Department in all non-financial applications.

The range of systems in use includes highway and bridge design, survey analysis, management information systems, etc.

The County Council has an ICL 1904S computer which is soon to be replaced by a large ICL 2972 machine running under VME/B. The Department has extensive facilities including RJE and video terminals, teletype terminals, desktop computers and a Benson on-line plotting system. The next purpose is the evolutionary expansion of all existing systems on to the new machine.

Applicants should have an engineering or scientific background and a relevant degree or HND/HNC with additional work. A proven systems analysis/design record and a thorough knowledge of FORTRAN is required. Experience of COBOL and ICL GEORGE III or VME/B is desirable.

Relocation expenses payable in appropriate circumstances, plus a salary dependent on experience.

Application forms and job specification available from the County Surveyor, St. Peter's House, Cutler Street, Ipswich IP1 1UQ, or by telephoning 0473 56258, ext. 309.

Closing date: 5th July, 1980.

Suffolk County Council

(1720)

INTERNATIONAL TRAVEL ORGANISATION IN PUTNEY

Hotelplan a Swiss-based Company require an

ANALYST PROGRAMMER

to join their young computer team currently developing new travel systems on their UNIVAC 90/30 computer systems.

Hours 9 a.m.-5.30 p.m. Monday to Friday, generous holiday concessions, L.V.s, ...

If you have 18 months' experience in COBOL and preferably some knowledge of OS/3 operating systems why not write to us at the address below for an application form enclosing a brief C.V. of previous experience:

Mr. D. Deverill, Personnel
HOTELPLAN INTERNATIONAL
329 Putney Bridge Road, London, S.W.15

(1709)

RESTORMEL BOROUGH COUNCIL CORNWALL

APPOINTMENT OF COMPUTER MANAGER/ PROGRAMMER

Grade SO2 £7,287 to £7,722

The Council will soon be upgrading its installation to an ICL 2903 with 40 K words user-store and 2 603.80 disc drives. Input will be via RDE key stations. At present the Council operates using a link to the Cornwall County Council 1904S installation and in the new installation certain programmes will still be run this way. An enthusiastic person is required to take control of the communication network which will cover both financial and non-financial systems. Experience of Cobol programming is essential and RPG programming advantageous, together with a good practical knowledge of ICL utilities.

This is an excellent opportunity for the right man or woman to obtain further experience in computer management and programming and to develop new systems at the outset of the new installation. The borough is situated in Mid-Cornwall and includes the town of Newquay in the north with its fine beaches and Trevarrack Holiday Camp in the south. The surrounding rural areas have attractive scenery and Bodmin Moor is in close proximity. New offices are in the process of being built in St. Austell, with occupation anticipated early in September, 1980.

Applications, stating age, qualifications, present post and salary, and past experience, together with the names and addresses of two referees, should be made by 5th July, 1980 to the Town Clerk, Polkyth House, Tregonissey Road, St. Austell, Cornwall PL25 4DA.

(1738)

AEROSPACE PROJECTS

West Germany

Analyst Programmers/ Systems Programmers

DM 50,000 — DM 80,000

Science Systems Ltd., a systems house specialising in the scientific/technical areas of computing, are seeking to recruit a number of experienced personnel to work on advanced technology projects in West Germany.

Ideally candidates should possess a numerate degree and have had a minimum of two years programming experience in a real-time environment using FORTRAN and/or ASSEMBLER.

Exposure to any of the following hardware would be extremely advantageous.

SEL 32/70 series	HP 2100
MODCOMP 4/Classic	ITT 3200
SIEMENS 330	SIGMA 7/9
UNIVAC 1100	HONEYWELL 6 or 66

Apart from the attractive salaries, Science Systems offers removal and other expenses plus the normal benefits that are associated with a progressive company.

Contact Derek Ashley at:
SCIENCE SYSTEMS LIMITED
60 Kings Road, Chelsea,
London S.W.3.
01-581 1481

science systems

(1744)

IMMEDIATE CONTRACTS FOR PROGRAMMERS

IBM 370 — **Middle East** — **£20,000 P.A. plus expenses**
COBOL (SENIOR PROGRAMMER)

IBM SYSTEM 34 — **South London** — **£ Neg.**
RPG2/DMAS

DEC PDP — **South London** — **£ Neg.**
DIBOL/CTS 300

IBM 370 — **South London** — **£ Neg.**
PL1

IBM 370 — **Central London** — **£ Neg.**
Cobol

These are just a few of our current vacancies.

For further details please contact:
NIC POLAND
TYLIN PEOPLE
A division of Tylin Management Systems Limited
Leon House, High Street, Croydon, CR9 3NH
01-680 2323
A member of the TATE & LYLE GROUP.

TYLIN

Members of Computing Services Association

(1750)

MYRIAD

SYSTEMS SOFTWARE PROGRAMMERS

THAMES VALLEY — **£7-£10,000**

A commitment to new systems software product development has now created a range of positions with our client, a major mini computer manufacturer based near Windsor in the Thames Valley. These are systems software programming positions which will offer the successful candidates the opportunity to perform design and programming work on new software products related to interactive systems, teleprocessing and database.

Ideally applicants will offer a minimum of three years of Assembler level programming experience, together with some software design knowledge and the people appointed can expect to contribute fully to all aspects of the development.

The company is pleasantly situated in modern offices and offers benefits including relocation and subsidised restaurant facilities.

REF. NW1/2606

SYSTEMS ANALYSTS

CITY — **TO £10,000**

This is an exciting opportunity for experienced Systems Analysts to effect an important career move.

Our client, located in the City, is seeking to expand its range of projects under development by recruiting additional systems staff.

If you can offer:
— Two years plus experience.
— Involvement in at least one project.
— The potential for project leadership.

Our client can offer:

— A stimulating and highly professional environment.
— Excellent career progression.
— Extensive development work using advanced techniques.
— A starting salary to £10,000 + good benefits.

Our client will also consider Analyst/Programmers who wish to move into a full systems analysis role.

REF. E2/2606

POTENTIAL ANALYSTS

N.W. LONDON — **TO £8,500**

Our client is a market leader in its particular sector of the retail industry and wishes to recruit additional Analyst/Programmers keen to develop their own careers into analysis.

Employing the use of database facilities in many applications, the successful applicants will join small project teams assigned to develop commercial systems from feasibility to successful implementation. Biased towards the financial areas of business, candidates will be encouraged to become fully involved in all aspects of systems design, user liaison and system implementation. Formal training will be provided where necessary in all areas of Data Processing.

Successful applicants will be able to offer at least three years' DP experience, ideally in an IBM environment, and have had some exposure to systems analysis in an analyst/programming position.

In addition to a positive career path a full range of company benefits is offered including a generous discount on company products.

REF. N1/2606

PROGRAMMERS TO PROJECT LEADERS

LONDON/S.W. ESSEX — **£6,000-£9,500**

Our client has outstanding openings for PROGRAMMERS through to ANALYST/PROGRAMMERS and PROJECT LEADERS. Successful candidates will work within a stimulating and highly professional environment using the most advanced techniques on a range of development projects.

PROGRAMMERS should have a minimum of one year's COBOL programming experience.

ANALYST/PROGRAMMERS should have a minimum of two years' experience; these positions will appeal to Senior Programmers who wish to move into systems analysis.

PROJECT LEADERS should be capable of designing and controlling projects from feasibility to implementation. In addition to real-time experience, a programming background is desirable.

Salaries cover the range £6,000 to £9,500 depending on the position.

The company has an outstanding record of growth and offers a secure and progressive career to the people appointed.

REF. E1/2606

BUSINESS SYSTEMS ANALYSIS

WILTSHIRE — **£7-£9,000**

Our client, a major commercial organisation, is seeking to recruit systems analysts wishing to undertake challenging project work in a highly successful business environment.

Current project work includes the development of teleprocessing systems based upon advanced hardware and candidates can expect to gain valuable new systems experience as well as utilising their own background to the best effect.

A sound commercial systems background is required together with business systems appreciation as the role will require the development of systems from initial business feasibility, through design to implementation.

The company offers a package of benefits which one would expect from a successful business operation and this obviously includes relocation assistance to this very attractive area of the U.K.

REF. NW2/2606

TECHNICAL PROGRAMMERS

N. SURREY — **c. £8,500**

As modern technology surges ahead, so is the demand for machine-oriented programmers who are capable of adapting to a range of small, yet powerful, machines. Our Client would like to discuss the positions which are currently available at their NORTH SURREY offices for LOW-LEVEL PROGRAMMERS seeking to develop "state-of-the-art" software. Some of these vacancies may well be filled by Systems Programmers, currently at mainframe installations, who would like a more interesting challenge, coupled with project management responsibilities.

The Company is a completely autonomous subsidiary within a very large group and is therefore able to offer a secure future and positive career to all employees, with rapid advancement for those persons displaying above average talents. For further information regarding these positions, please telephone 01-353 0981, quoting

REF. S2/2606

ANALYSTS TO SENIOR ANALYSTS

NORTH OF LONDON — **£8,000-£11,000**

Reflecting the demand of their users, our clients have vacancies for experienced Systems Analysts.

Joining a company whose Data Processing is still developing will provide scope for individual advancement and opportunities to take full project control responsibility for certain systems. Employing Database and on-line techniques in nearly all new developments on their IBM mainframes will provide a stimulating environment to design and implement systems encompassing financial, stock movements and business forecasting systems.

Candidates should possess a solid DP background, preferably through a programming discipline, and have successfully controlled the implementation of at least one commercial system.

In addition to attractive starting salaries, comprehensive conditions of employment apply together with the assurance of career progression geared to individual merit and performance.

REF. N1/2606

MOVE TO ANALYSIS

C. LONDON — **£6,500-£8,500**

Three ANALYST/PROGRAMMERS will strengthen a project team which has just completed the initial stage of a real-time, financial system. They will assist with the system design, program specification/development and the subsequent implementation of the system on advanced mainframe equipment. Great importance is placed on the "top-down" approach to program design so applicants should be conversant with this methodology whilst possessing a sound knowledge of COBOL.

On completion of this project, they will join a systems teams to investigate user requests and be responsible for the feasibility studies under the direct guidance of a Senior Analyst.

Based in CENTRAL LONDON, one of the positions will be filled by a Junior person in the salary range £5,500-£7,500 and the other two can expect circa £8,500 p.a. depending on their experience.

REF. S1/2606

MYRIAD APPOINTMENTS LIMITED
30 Fleet Street, London EC4Y 1AA Telephone 01 353 0981 24 hours

(1770)

OPPORTUNITIES WITH THE CEGB

The Central Electricity Generating Board, responsible for generation and transmission of electricity throughout most of Britain, has computing support from a Headquarters Centre operating IBM-based services, Regional Centres using ICL main frames, and minicomputer systems for process control and real-time operation.

PROJECT LEADER/SENIOR ANALYST-NETWORK DEVELOPMENT

More widespread and varied use of computing brings a need to make decisions regarding the form future data communication facilities will take and someone is now needed to contribute to the planning and design of a corporate data communications network and to work as required in progressing software development projects.

Applications for this post, based at London Headquarters, are invited from persons holding a good degree in a science or related subject, and have experience in some of the following areas:

programming and program design, including data communications or real-time systems;
data communications, architectures and protocols,
trends in computing and data communication.

Ability to consult and prepare information for both technical and managerial staff, and knowledge/experience to undertake detailed planning activities, is a firm requirement. **Ref. CW/139.**

CONSULTANT-PROCESS CONTROL AND SPECIAL PURPOSE COMPUTING

An experienced computer person is needed to work on software projects covering a range of applications supporting data acquisition and plant control requirements. Those applications use real-time mini and microcomputer systems to provide data collection and recording, VDU display presentations and telecommunications and control facilities.

Project teams are engaged in design and development of application and system software and advanced techniques are being developed and applied to ease the system evolution process, maintain high standards and reduce life-cycle costs

The post is at London Headquarters and applications are invited from persons interested in working on design and implementation of significant schemes. Candidates should be of degree level and have several years experience including programming/systems analysis; design and implementation of application and/or system software, liaison with users from initial assessment of specifications to system testing and acceptance; design and leadership responsibilities within a software project team framework. Applicants should also have an awareness of and interest in today's software design and development techniques.

Experience with minicomputer or microcomputer system development, real-time operating systems, or the programming language CORAL, though not essential, would be an advantage. Necessary training would be given.
Ref. CW/137.

Each appointment will be within a salary range of £11,916-£15,081 per annum inclusive.

Applications stating full relevant details and present salary to the Group Personnel Officer, CEGB, Sudbury House, 15 Newgate Street, London EC1A 7AU, by 7 July 1980 quoting appropriate reference.

CENTRAL ELECTRICITY GENERATING BOARD HEADQUARTERS

IBM OPERATORS

c. £5000 + 20% SHIFT ALLOWANCE + OVERTIME

Once again we are looking for experienced operators to fill the gaps left by transfers to our programming training scheme.

Applicants should have at least 6 months actual experience operating an IBM 370 range computer, in a multiprogramming environment, under DOS/VS, POWER/VS.

Full working knowledge of:- POWER/VS commands
3203 Model 4 printers
is essential.

Additional experience of operating TP processes and a working knowledge of EPAT and Catalogued Procedures would be of considerable advantage as would any commercial experience gained prior to operating.

The Save & Prosper Group was founded in 1934 and in addition to being Britain's largest unit trust group is also a major force in life assurance, pensions and annuities.

Our main administrative offices are at Gants Hill, Ilford but we shall be relocating the Computer Department to central Romford during the latter half of 1982.

The installation comprises:-
IBM 370/148
5x 3420 Model 5
3340/3344 2100 MB ON-LINE
2x 3203 Model 4
1x 2501
Various T.P. equipment local and remote.

We operate a 4 shift system which results in being "off work" but on "standby" 1 week in 4 to cover holidays and other absences. Overtime is paid for such additional hours worked and an operator should earn between £800-£1,000 per annum in overtime payments.

We are a progressive organisation whose policy is to promote from within, providing AUDIO/VISUAL TRAINING with opportunities for operations personnel to join a formalised PROGRAMMING TRAINING course. Employee benefits include non-contributory pension and life assurance, BUPA (self and dependants), Company assisted savings plan (after qualifying period), 20 days holiday, L.V.'s 45p per day.

All applicants will be expected to undertake an aptitude test which is a prerequisite of an interview.

Please contact M. Dickinson on 01-554 [illegible] who will arrange an appointment to take an aptitude test.

SAVE & PROSPER GROUP

Field Engineers Support Engineers

PRC I (UK) Limited is the British company of the world's largest information sciences corporation with a substantial investment programme in the UK. Just to prove the point to you, we are adding Manchester and Wakefield to our network.

We need support and field staff for those two new operating teams, and additional personnel in Twickenham.

You should have a good knowledge of engineering with particular reference to Digital Equipment Corporation or Prime operating systems.

The benefits of working for us in these posts amount to about £12,000 p.a. including car, health and salary protection schemes. In the longer term, career and salary opportunities are difficult to match and are worldwide.

Telephone or write with details to Barbara Clark, Planning Research Corporation International (UK) Limited, St George's House, Church Street, Twickenham, Middlesex. Tel: 01-891 4021. Interviews will be held locally.

prc

Planning Research Corporation International

(1698)

Systems Programmers

for new DP Centre, London

Our new DP Centre, houses two IBM 370/168AP processors, and is shortly to be supplemented by a 3033N. Our increasing commitment to terminal based systems has led to a need for three more systems programmers with 2 to 3 years' experience of operating system and/or teleprocessing software and with a sound current knowledge of one or more of the following: MVS, SE, JES2, TSO, CICS, VSPC, ACF/VTAM in a system programming environment.

A highly competitive remuneration package is negotiable dependent upon experience and qualifications. Additional generous benefits include low-cost mortgage and non-contributory pension schemes together with flexible working hours.

Please forward a detailed curriculum vitae to:
Ann Bazell, Staff Department,
Prudential Assurance Co. Ltd.,
142 Holborn Bars, London EC1N 2NH.

Prudential

(1735)

Senior Systems Analyst

Management Consultancy North West to £12,500

Our clients are expanding their data processing capabilities with a new project starting in the North West. To complete the team, they need two Senior Systems Analysts to undertake the design and systems specification of a Project Management Information System.

As Consultants, their work includes most aspects of data processing, from application design through to systems software. Generally their work involves solving problems with multi-discipline teams, where opportunities exist for broadening or increasing your depth of knowledge. They offer interesting and varied work where personal fulfilment can be achieved whilst improving your professional status.

On completion of this project, they can offer considerable opportunities both in the UK and overseas.

Please telephone James Vallee on 01-439 3410, or write to him at Austin Knight Limited, London W1A 1DS. Applications will be forwarded to the client concerned, therefore companies in which you are not interested should be listed in a covering letter.

AK LONDON

Austin Knight Advertising

THINK BIG THINK FUTURE THINK PROCESS CONTROL

OPPORTUNITIES FOR SOFTWARE AND HARDWARE PEOPLE

- Salaries to £9,500 p.a.
- International travel
- Project responsibility
- Based in North Herts

Process control is one of the fastest growing sectors on the international scene and our client has bulging order books to prove it.

Demand for their digital process control and instrumentation systems has created brand new vacancies with excellent career development prospects for **systems engineers, hardware engineers and applications programmers.**

Ideally we are looking for people with mini computer or instrumentation background, possibly gained with a computer manufacturer. You should preferably have HNC or a degree in a numerate discipline and applications programmers should be familiar with at least one assembler level language.

The work could involve some overseas travel and you will be continually trained to keep your experience up to date with new technology. These are excellent opportunities for career minded men and women.

Salaries are competitive, working conditions are very good and the company will help with relocation costs where appropriate.

We have more information on the company, its products and its future plans. Call Mary Stone for the facts or write to the address below:

CASTLE RECRUITMENT

271 High Street
Berkhamsted, Herts.
Phone: (04427) 73151

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Excellent Contract Opportunities

In line with our rapid growth rate we have a continuous requirement for skilled and dedicated professional contract staff:

MARK IV, Programmer/Analysts — Essex, London, Europe

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DOS/CICS, Software/Programmers — Essex

REDIFON R850, Programmer/Analysts — London, Middle East

COBOL/IBM, Programmer/Analysts — Essex, London

CMC/REALITY, Programmer — North West

For more information telephone
Alan King
TANGENT COMPUTER SERVICES
1 Eastern Road
Romford, Essex
Tel: Romford 44181/2 28238

(1740)

STAR JOB SPOT

SYSTEMS & PROGRAMMING MANAGER
TO £11,000
MIDDLESEX

A major commercial organisation heavily involved in the glamorous film industry wishes to appoint a project leader type. He will take total charge of a small staff involved in various new application areas including Marketing, Finance and International M.I.S. Both IBM and minis are in operation so the right applicant should have supervisory and at least 3 or 4 years' COBOL experience, and can look forward to a first-rate career within this company.
CW 26/1, Michael

OPERATORS
TO £8,000 inc.
LONDON & HOME COUNTIES

If you have 1 year + IBM or ICL operating experience, then we may have the job you are looking for. We have a wide variety of permanent positions in the LONDON/HOME COUNTIES areas. Ring Tricia to discuss your particular requirements.
CW 26/2

CONTRACT PROGRAMMERS U.K. AND OVERSEAS TO £450 p.w.

PL1 DOS	CITY	3MTHS.
PL1/COBOL	LONDON	3MTHS.
HP3000 IMAGE	LONDON	3MTHS.+
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COBOL DOS/OS	W. GERMANY	6MTHS.
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DOS COBOL IMS	HOLLAND	6MTHS.

RING IRENE NOW!

PROGRAMMER/SENIOR PROGRAMMER
£6,500 TO £8,000
E. LONDON

Our clients smell just fine! They are part of a large International perfumery and flavours manufacturer based in a very new modern complex with a dynamic Management Services Department where these two ICL COBOL vacancies exist. They have the very latest ICL ME 29 on order which will be connected to large 2900s in the Midlands. They can offer to the right applicant (with at least 2 yrs' experience) exciting manufacturing and commercial systems to be developed and implemented. Perks include 24 days hols. and a non CPS and insurance scheme.
CW 26/3 Michael

MINI SALESMEN
QUOTA EARNINGS
£15,000 + 2 LITRE CAR
SURREY, SUSSEX & CITY

A very successful American mini manufacturing and marketing organisation (over 300 salesmen in the States) has recently set up shop in this country. They have an excellent product with top-grade support serving the total DP needs of small and medium-sized companies and having comprehensive Timesharing and multiprogramming capabilities.
CW 26/4

(1724)

UCA Recruitment Consultants
UNIVERSAL COMPUTER ASSOCIATES LIMITED
01995 3883 (01958 6138 Evenings)
Data Express House, 3 Prospect Place, Heathfield Terrace, Chiswick W.4

NORTHERN APPOINTMENTS

Where the grass is greener.....

THERE has never been a better opportunity for people in DP to develop their careers in the North. Unfortunately the individual is often faced with a bewildering and confusing selection of seemingly good career opportunities.

How do you sort the "wheat from the chaff"? Is it the right move for you? Should you even be considering moving from your present company? These are questions not easily answered.

Someone has to sort through the maze and pluck out the right career opportunity, the correct move for you.

It is essential that the person entrusted with this is a fellow professional with practical experience in your area of specialisation.

The consultancy should preferably be seen to have a policy of employing high calibre, mature and experienced consultants to enable the completion of recruiting assignments over a broad range of high technology industries.

A professional consultancy has in-depth experience in creating job specifications; writing advertising copy; placing it in the right publications; reviewing salary scales; interviewing and screening; presenting short lists; and arranging letters of offers and subsequent acceptance.

While looking for the professional consultancy, it is always preferable to choose one with an office not only in the North but in other locations. This will ensure that the full range of opportunities available for the development of your career can readily be identified.

When you are finally talking "over a desk" with a consultancy, ask the consultant to explain the modus operandi of the organisation, what relevant experience the consultants have, job and company specifications, procedure for submissions to prospective employees and progress reporting.

Remember he is acting on your behalf and the more professional his approach is to companies, the better you will appear as a potential employee.

Photocopied application forms or hastily-prepared resumés will not put you in a good light. When you have decided that the consultancy is professional enough to represent you, and you feel comfortable, then you should start discussing your background and aspirations for the future.

During your discussion the consultant will be building up a picture of your past experience and through asking relevant questions, will be identifying areas where your skills and potential can be directed to the advantage of your career.

When he has identified opportunities he will discuss the background of employers, including their employment package, relocation details, career progression and working environment including the individual personalities within these companies.

He will also be able to advise on housing in the North, areas to avoid, estate agents and mortgage companies to contact.

There are so many career opportunities not advertised in the North that the individual can only hope to hear about a small percentage of these through his own resources.

There are computer manufacturers, both expanding and opening new offices in the area; computer bureaux and software houses going through large expansion phases; and there are numerous user companies, from the smallest mini through to the largest data processing installation in Europe, undergoing developments in the areas of distributed processing, communications, databases, CAD, and microtechnology.

Another advantage of the North for people moving into the area is housing, up to 50 per cent cheaper than comparable houses in the South.

The professional consultancy will guide you through the maze, and open windows and doors to Northern opportunities you may not even have considered.

So many people have had bad experiences with the smaller consultancies, that time spent talking to a professional consultancy's Northern office could change your career direction and ultimately change your life!

Your skills as a field engineer; in operations; in programming and analysis; in sales or marketing, at all levels, have been earned. So choose wisely and carefully that professional consultancy — via which path the grass is greener.

● The author is a senior consultant with the Manchester based firm, IMPC.

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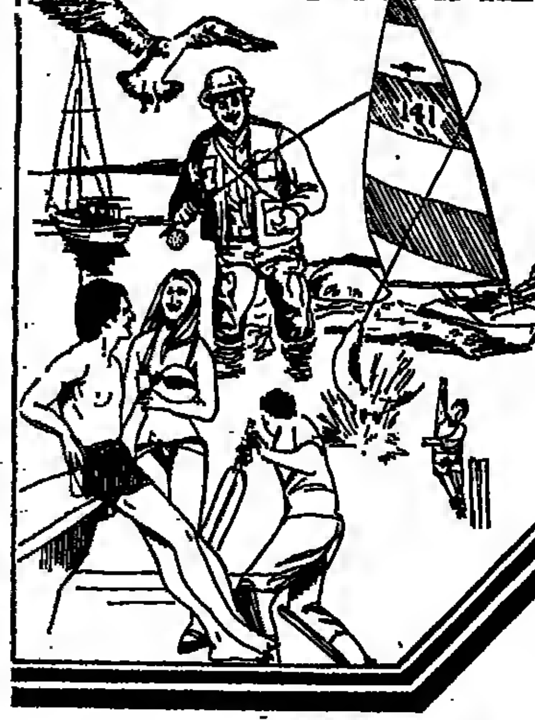

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(1884)

VA

MANCHESTER

Senior Systems Programmer Salary £8,500

A Senior Systems Programmer is now required for this client who is about to take delivery of the first of 2 IBM 4341s running under OS/VS1 to support a sophisticated Distributed processing network utilising DEC PDP11/70 hardware. Responsibilities will include ensuring that all computer operating systems and associated software, including telecommunications software, and database [illegible] is tested generated and maintained, and therefore calls for a strong background in IBM software utilities, including [illegible] Processing Services and User Depts. You will also assist in the appraisal and selection of the future hardware and software requirements and lead a team of three systems programmers, providing an exciting and challenging opportunity to enhance your career. Terms and conditions of employment are commensurate with most large companies, including generous relocation expenses.

Ref. CW 1680

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1 Senior Systems Analyst Salary up to £7,800
3 Systems Analysts Salary up to £7,400

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Ref. CW 2680

SOUTH MANCHESTER

Programmers and Systems Analysts

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Ref. CW 3660

SOUTH MANCHESTER

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Senior Programmer Salary up to £7,500

As the Computer Services Centre for a major engineering organisation, our client offers comprehensive group computing services based on IBM 3033 hardware with an extensive telecommunications network supporting remote job entry, timesharing and on-line users. The expanding developments of on-line systems has resulted in the need for additional senior staff with a professional and ambitious approach. Ideally they require candidates with a minimum of 3 years COBOL experience preferably on IBM equipment. A knowledge of IMS and on-line techniques would be an added advantage.
Attractive large company benefits apply including relocation expenses where necessary.

Ref. CW 4678

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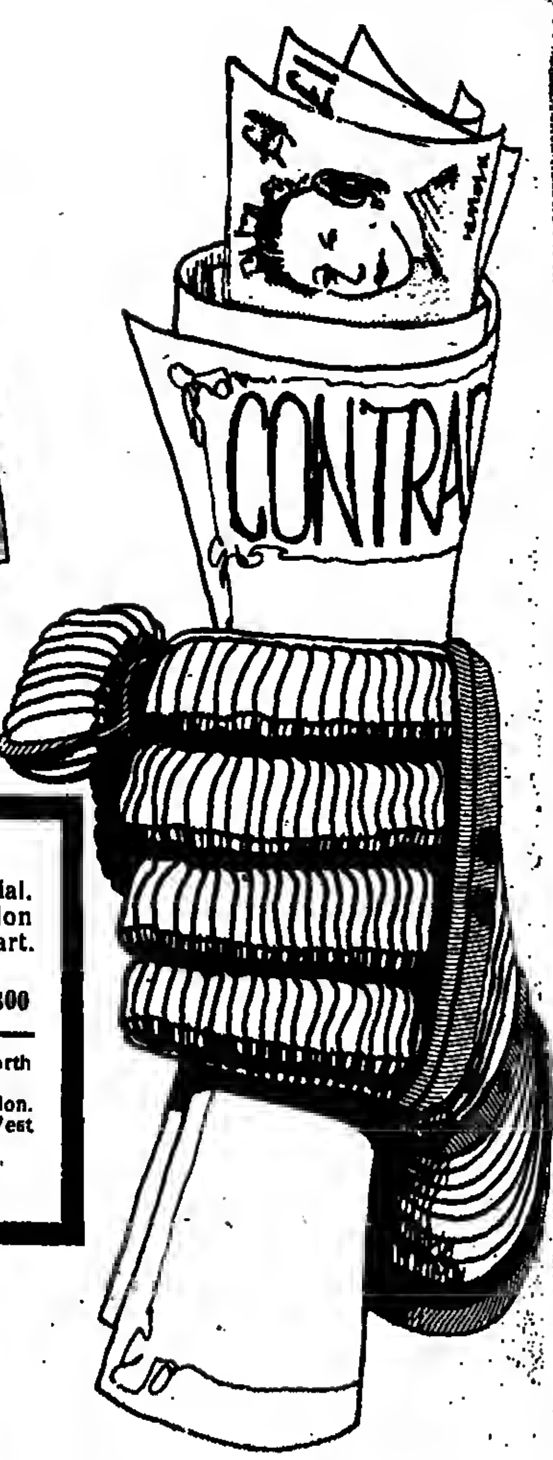

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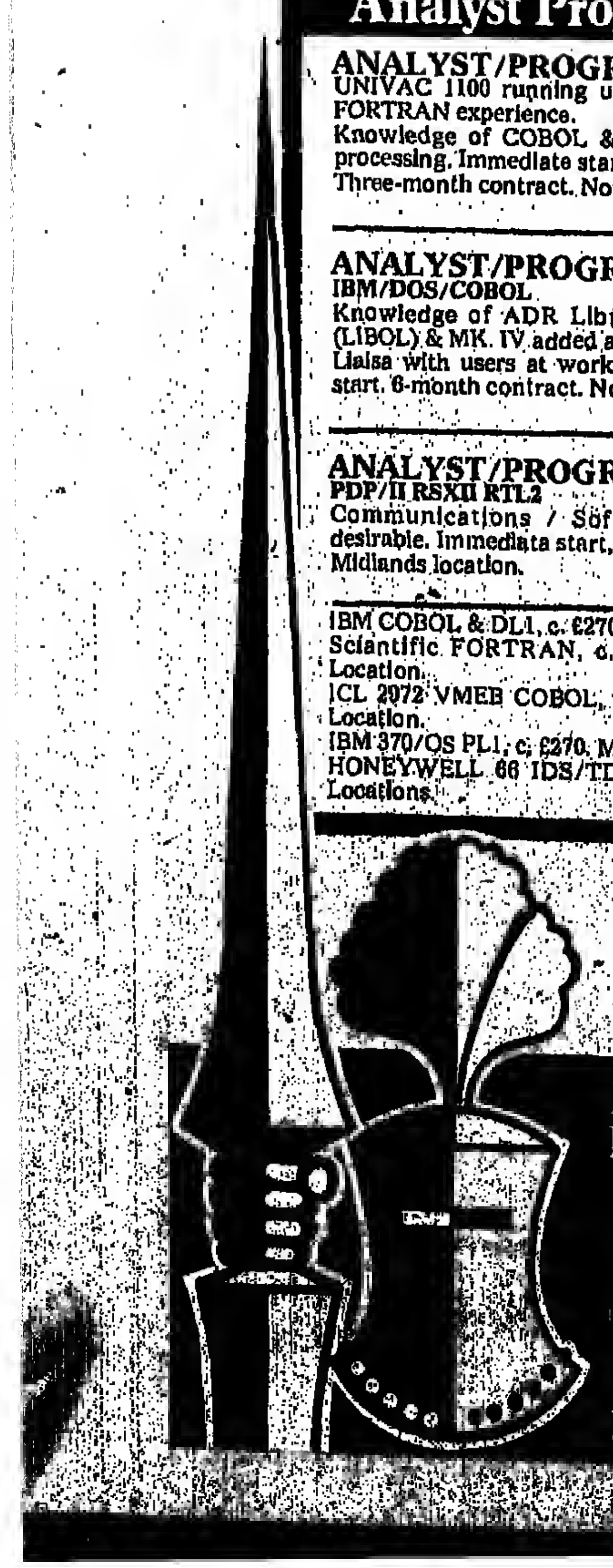

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SYSTEMS ANALYST — to £7500
Candidetes for this position must have at least two years experience in systems analysis and design, following a period as a programmer. Previous applications experience should includa stock control and order processing. *(Reference CW/8061)*

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(1786)

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SYSTEMS ANALYST — £7,500 plus + large company benefits.

IBM installation requires a System Analyst and an experienced programmer for a variety of development work. The present hardware is a 370/138 soon to be replaced by a 4341. The Systems Analyst should have a minimum of two years' experience in a manufacturing industry on production and stock control systems. DL1 Database experience will be an advantage. The programmer should have around two years' experience of COBOL. Experience of CICS would be an advantage.

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The Company has an ICL 2980 and PDP 11s.

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(1722)

South Yorkshire County Council PLANNING DEPARTMENT

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POST REF: P187 Grade AP2/5
Salary £3,990 to £6,381

The Planning Department is looking for a Programmer/Analyst with suitable experience to join a small team engaged in programming and systems work. In addition to undertaking general programming duties, the successful candidate will contribute towards developing computer systems to meet the data processing needs of the Department.

Applicants must have a working knowledge of COBOL and, preferably, FORTRAN. Experience in the use of ICL machinery and packages and the GEORGE 3 Operating System would be an advantage. Applications will be considered from trainee programmers as well as from persons with more experience.

The Department is linked via VDU to the County Council's 1904S computer and also has access to a CADMAC Plotter/Digitiser. Further information can be obtained by telephoning Dave Wilson, Barnsley 86141, Ext. 482.

Closing date for applications will be 11th July, 1980.

Please write or telephone for an application form quoting the appropriate post reference to the Chief Executive (Personnel), South Yorkshire County Council, County Hall, Barnsley S70 2TN. Telephone Barnsley (0226) 86141, Ext. 266.

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Applications are invited for D.P. staff who have at least 1 year's experience of assembler level programming, desirably on a IBM 370 under DOS/VS and who are interested in working on a new agency accounting system.

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(1888)

Quadrant Recruitment Ltd. ... House, Queen Street, Sheffield

The ambitions of programmers

LAST year Greater Manchester Transport, having completed the preparation of a five-year system development plan, set out to expand its systems and data processing department to take on the extra work. About 20 people were involved of all skills and grades — from programmer to system design manager.

Today, about a year later, recruitment is nearly complete, but it has taken the whole year to achieve this.

Most difficult of all was the recruitment of programmers. It was impossible to recruit programmers with about two or three years' experience. People with this level of experience in programming appear to offer themselves only for more senior posts such as program designer (in GMT's case) or analyst/programmer or even systems analyst.

Contacts with other people in the trade indicate that this is not unique, either to the North West or to public utilities and local authorities. It may, however, have something to do with salary levels and there is some evidence that although GMT pays slightly better than the median salary for programmers for this area this is not enough to retain programmers with two to three years' experience in pure programming jobs.

Making a significant change in the salary for programmers, however, is not easy in a highly structured salary system such as public utilities and local authorities use. The knock-on affect on the more senior grades is very difficult to cope with in such a structure.

In any case, only a limited number of programmers appear to want to stay in programming at any salary. Most prefer to start broadening their skills as soon as possible and the subjective feeling among candidates we interviewed was that about two years was enough in pure coding.

To some extent this phenomenon repeats itself throughout the range of more senior posts. For example, many analysts of fairly limited experience were searching for project leaders' jobs rather than for better paid analysts' jobs. The general picture seems to be of a population which seeks a rate of promotion very much faster than in any other profession or occupation —which, may, in fact, be dangerously fast.

A more welcome aspect of this, of course, was that many candidates presented themselves for the system design management posts. However, many of these have a narrow basis for successful development in such jobs.

At this level, the abilities to recognise and deal with general business problems and to relate effectively to departmental and functional management are more important than the more mechanistic programming and systems analysis skills.

The author, William Drynan, is systems and DP manager with Greater Manchester Transport.

The majority of candidates lacked these additional skills and the rate of movement of people within DP together with the "sealed" nature of the occupation makes it difficult for those within to obtain such skills.

In addition to these general trends, there were a number of problems associated with the fact that GMT is a public utility located in the North West. Many candidates, especially for the more senior posts, expressed concern about the hierarchical rigidity and old fashioned style (as they imagined them) of public utilities. This is more imaginary than real.

As someone having experience of both private industry and public utilities I do not find it to be so. Most candidates who were interviewed appeared to satisfy themselves quite quickly from the nature and content of the interview that this would not be a problem for them.

As to the second matter, many candidates from the South and the Midlands were apprehensive about things such as the price of housing, the level of educational services and even, in one case, the availability of non-violent soccer matches.

However, I do not think this problem is unique to those recruiting in the North West. It is much more likely that people who hold these opinions strongly simply do not apply for jobs in the area.

Certainly, my experience is of hearing more people state passionately that they would rather work in any other part of the UK than central London.

All in all, the problems GMT encountered during the last year's recruitment effort were more those shared by all DP managers, than those specific either to the North West or to public utilities.

NORTHERN APPOINTMENTS

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(1780)

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Appointment will be made at Senior Scientific Officer grade, on the salary scale £6332 to £8705 per annum (under review). Applicants should possess a good honours degree in a relevant subject, plus at least four years relevant post graduate experience.

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NORTHERN APPOINTMENTS

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(DR/1504)	12 + months ICL COBOL	5500
(DR/1505)	6 + months COBOL	4500

EAST MIDLANDS

ANALYSTS

Ref		£
(DR/1506)	5 + years senior financial background	9000
(DR/1507)	4 + years senior commercial	9000
(DR/1508)	3 + years project leader financial experience	9000
(DR/1509)	3 + years senior commercial experience	8500
(DR/1510)	3 + years senior analyst/programmers COBOL	8000
(DR/1511)	2 + years analyst/programmers on-line real time	8500

PROGRAMMERS

Ref		£
(DR/1512)	5 + years lead programmer IBM COBOL	8000
(DR/1513)	5 + years team leader ICL COBOL	8500
(DR/1514)	2 + years systems programmers DOS CICS	8500
(DR/1515)	3 + years senior ICL COBOL	7750
(DR/1516)	4 + years ICL COBOL	7750
(DR/1517)	4 + years senior ICL COBOL	7500
(DR/1518)	2 + years COBOL CICS DL/1	7500
(DR/1519)	3 + years COBOL technical/commercial	7000
(DR/1520)	2 + years IBM COBOL CICS	7000
(DR/1521)	2 + years COBOL and/or ASSEMBLER	7000

MIDLANDS CONTACT ROGER PICKIN

NORTH EAST

ANALYSTS

Ref		£
(DR/1522)	3 + years senior analyst commercial environment	8000
(DR/1523)	senior analyst – manufacturing systems	7500
(DR/1524)	senior analyst – financial systems	7500
(DR/1525)	3 + years including programming background	8500
(DR/1526)	2 + years commercial (COBOL background)	8500
(DR/1527)	2 + years commercial IBM installation	8500
(DR/1528)	18 + months production control experience	5500

PROGRAMMERS

Ref		£
(DR/1529)	2 + years COBOL – commercial	7000
(DR/1530)	2 + years PL/1 preferred	6250
(DR/1531)	2 + years COBOL	6250
(DR/1532)	18 + months IBM COBOL some CICS experience	6700
(DR/1533)	12 + months IBM experience preferred	5000

HUMBERSIDE

ANALYSTS

Ref		£
(DR/1534)	3 + years senior commercial/financial	8000
(DR/1535)	senior analysts manufacturing systems	7750
(DR/1536)	3 + years database commercial systems	7500
(DR/1537)	3 + years analyst/programmers ICL background	7000

PROGRAMMERS

Ref		£
(DR/1538)	4 + years senior COBOL and ASSEMBLER	7500
(DR/1539)	3 + years senior programmer IBM installation	7000
(DR/1540)	3 + years COBOL	6750
(DR/1541)	3 + years ASSEMBLER CICS	8750
(DR/1542)	12 + months programmer ICL preferred	5500

NORTH EAST AND HUMBERSIDE CONTACT ROY DRURY

GREATER MANCHESTER

ANALYSTS

Ref		£
(DR/1543)	18 + months commercial – IBM site	6250
(DR/1544)	18 + months commercial – ICL preferred	6500
(DR/1545)	2 + years manufacturing systems	5750
(DR/1546)	2 + years financial systems	7000
(DR/1547)	3 + years – IBM preferred	7500
(DR/1548)	3 + years commercial (COBOL background)	7500
(DR/1549)	senior analysts financial systems	8000
(DR/1550)	senior analysts manufacturing systems	8000
(DR/1551)	senior analysts IBM or ICL background	8250

PROGRAMMERS

Ref		£
(DR/1552)	18 + months ICL COBOL	5000
(DR/1553)	18 + months IBM COBOL	8250
(DR/1554)	2 + years ICL COBOL	6500
(DR/1555)	2 + years IBM COBOL	6500
(DR/1556)	2 + years Honeywell COBOL	8500
(DR/1557)	2 + years IBM ASSEMBLER	7000
(DR/1558)	3 + years IBM COBOL	7500
(DR/1559)	3 + years Honeywell COBOL	7500
(DR/1560)	3 + years ICL COBOL	7500
(DR/1561)	chief programmers – IBM preferred	8250

LANCASHIRE

ANALYSTS

Ref		£
(DR/1562)	18 + months analyst/programming	6250
(DR/1563)	18 + months commercial (COBOL background)	6250
(DR/1564)	2 + years commercial – ICL preferred	6500
(DR/1565)	2 + years financial systems	7000
(DR/1566)	2 + years commercial – IBM site	7500
(DR/1567)	3 + years commercial – ICL preferred	8000
(DR/1568)	3 + years financial systems	8000
(DR/1569)	3 + years commercial – IBM preferred	8000
(DR/1570)	senior analysts commercial systems	8500

PROGRAMMERS

Ref		£
(DR/1571)	18 + months ICL COBOL	6000
(DR/1572)	18 + months IBM COBOL	6250
(DR/1573)	18 + months Honeywell COBOL	6250
(DR/1574)	18 + months IBM ASSEMBLER	6500
(DR/1575)	2 + years IBM COBOL	7000
(DR/1576)	2 + years Honeywell COBOL	7000
(DR/1577)	2 + years ICL COBOL	7000
(DR/1578)	3 + years IBM ASSEMBLER	7500
(DR/1579)	3 + years IBM COBOL	7500

MERSEYSIDE

ANALYSTS

Ref		£
(DR/1580)	12 + months commercial	5500
(DR/1581)	18 + months commercial	6000
(DR/1582)	18 + months commercial (COBOL background)	6250
(DR/1583)	18 + months manufacturing systems	6250
(DR/1584)	18 + months commercial – IBM preferred	6500
(DR/1585)	2 + years production systems	7000
(DR/1586)	2 + years commercial – IBM site	7000
(DR/1587)	2 + years analyst/programming DEC background	7000
(DR/1588)	senior analysts commercial systems	7500
(DR/1589)	senior analysts manufacturing systems	8000
(DR/1590)	senior analysts – IBM preferred	8250

PROGRAMMERS

Ref		£
(DR/1591)	18 + months BASIC on PDP-11	6000
(DR/1592)	18 + months ICL COBOL	6000
(DR/1593)	18 + months IBM COBOL	6000
(DR/1594)	18 + months Honeywell COBOL	6000
(DR/1595)	2 + years ICL COBOL	6250
(DR/1596)	2 + years PDP-11 BASIC	6250
(DR/1597)	2 + years IBM ASSEMBLER	7000
(DR/1598)	2 + years IBM COBOL	7000
(DR/1599)	3 + years COBOL any mainframe	7500
(DR/1600)	senior programmers – Honeywell preferred	8000

YORKSHIRE

ANALYSTS

Ref		£
(DR/1601)	18 + months analyst/programming ICL site	6500
(DR/1602)	2 + years commercial systems	7000
(DR/1603)	2 + years financial systems	7250
(DR/1604)	2 + years commercial – ICL preferred	7500
(DR/1605)	3 + years commercial (COBOL background)	8000
(DR/1606)	3 + years commercial – IBM preferred	8000

PROGRAMMERS

Ref		£
(DR/1607)	18 + months ICL COBOL	6250
(DR/1608)	18 + months IBM COBOL	6500
(DR/1609)	2 + years RPG II	6500
(DR/1610)	2 + years IBM ASSEMBLER	7000
(DR/1611)	2 + years COBOL any mainframe	7000
(DR/1612)	senior programmers – ICL site	7500

NORTH WEST & YORKSHIRE CONTACT CATHY SCOTT

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MACHINES USED ______
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SALARY ______ SALARY REQUIRED ______ CW/19/6

DR

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TELEPHONE HARROGATE 66311

24 HOUR ANSWERING SERVICE

DATA RESOURCES

WEST YORKSHIRE METROPOLITAN COUNTY COUNCIL

ASSISTANT PROGRAMMER/ANALYST

POST REF. ES 19 003

£4,581-£7,722

The Directorate's computer group in the Engineering Services Unit, will use the County 4Mb IBM 3031 (due July), through a network of scientific distributed processors and terminals including a Calcomp 7000 flat-bed plotter, Ferranti digitiser and three Tektronix displays.

The group needs engineering, mathematics and computer science graduates to write cost effective programs for highways, structures, traffic, transportation, planning and engineering management. Interactive programming, graphics and microcomputer know-how is valuable and professional computing experience in Fortran, Cobol, Basic or Pascal is important.

Successful applicants pursuing professional status may qualify for accelerated progress to the senior-officer scale. Chartered engineers and corporate members of the BCS will be appointed directly onto the senior officer scale (£6,636-£7,722)

Application forms from Directorate of Planning, Engineering and Transportation, Room 238, County Hall, Wakefield to be returned by 11 July, 1980. Telephone T. Endersby (Wakefield 67111, Extension 3515) for details.

(1677)

METROPOLITAN BOROUGH OF

Rochdale

Treasurer's Department

Rochdale Metropolitan Borough Council currently operates an ICL 2960 running under DME and plan an early implementation of VME/K. In order to fulfil an ambitious development/conversion plan the following position must be filled

TECHNICAL SUPPORT PROGRAMMER

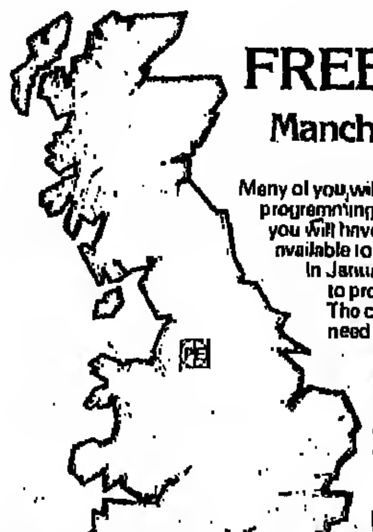
APS £5,873/£6,381

The postholder will be responsible to the Operations Manager for all software aspects of the installation, and in particular, support of the operating systems, currently George II under DME. It is envisaged that conversion to KSV/17 will commence shortly with full implementation early in 1981. Ideal candidates should therefore be conversant with both 1900 software and the problems of a large scale operating system.

Removal expenses are payable and assistance with accommodation is available in appropriate cases.
(Ref. No D943)

Application form and further details available (by quoting ref. no. D943) from the Chief Personnel Officer, P.O. Box 60, Floor 6, Municipal Offices, Smith Street, Rochdale OL16 1XG (Tel: Rochdale 47474 Ext. 662) to whom they should be returned by Monday, 7th July, 1980.

(1749)



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Many of you will know of P-E's reputation for high quality systems and programming work. If you have worked with us on a freelance basis you will have appreciated the technical and administrative support available to you.

In January 1980 we opened a branch in Manchester in order to provide a more extensive service to our Northern clients. The consequent increase in business has meant that we now need further professional freelance consultants, analysts and programmers to work with us on a variety of interesting and rewarding assignments.

Whether you are available now, or in a few weeks or months, plan your freelance career by telephoning or writing with your c.v. to the Regional Manager, Geoff Mackenzie, at the address below.

P-E Computer Services Limited
Winchester House, Fountain Street,
Manchester M2 2EF. Telephone: 061-228 2776.

THE UNIVERSITY OF MANCHESTER

EXPERIMENTAL OFFICER

IN THE DEPARTMENT OF COMPUTER SCIENCE

An Experimental Officer is required to be responsible for the running and continuing development of the recently established MICROPROCESSOR TEACHING LABORATORY.

Applicants should have a degree in Computer Science, Electronic Engineering, Physics or an equivalent qualification. Previous microprocessor experience would be an advantage but it is not essential. Salary range: £5,052-£8,788 p.a. Superannuation. Details and application forms (returnable by July 14th) from the Registrar, The University, Manchester M13 9PL. Quote ref.: 140/80/CW.

(1781)

University of Petroleum and Minerals Dhahran, Saudi Arabia

Our configuration consists of an IBM 3033 and an IBM 370/158 operating under VM/CMS-SPF, MVS/TSO-SPF and CICS with telecommunications/tele-processing networks. We now need the following:

SYSTEMS PROGRAMMERS

With a B.Sc degree, 3-5 years experience and a knowledge of Assembler and PL/1. Experience gained in a higher educational environment would be an advantage.

PROGRAMMER/ ANALYST-ACADEMIC/ RESEARCH SUPPORT

With a scientific or engineering B.Sc together with Fortran and/or PL/1 experience. A working knowledge of HSL, SSP or any of the following packages is desirable: CHESS, ICES, STRUDL, CSMP. The job will involve CAD and interactive graphics support as well as consulting and development.

ADMIN. D.P. SUPPORT

With a B.Sc degree and 3-5 years experience in business D.P. The work will involve systems development and maintenance using CICS and VSAM.

The University offers regular renewable 2 year contracts, tax free competitive salaries and allowances, plus air transport to and from Dhahran for each 2 year tour. Housing in kind will be provided if available, otherwise a cash allowance will be made for outside living. There are 45 days paid vacation and generous holidays.

Please apply as soon as possible with a detailed C.V. including home and office addresses and phone numbers to:-
University of Petroleum and Minerals, c/o Gabbitas-Thring Services Limited, Broughton House, 6, 7, and 8 Sackville Street, London W1X 2BR.
Tel: 01-734 0161.

COMPUTER APPLICATIONS

Planning Engineer

£8000pa neg.

IAL, an international aviation and communications organisation, can offer careers to people with practical engineering experience in the telecommunications industry. We now require a computer engineer within our Telecomms Division, to work as part of a small consultancy team providing computer applications expertise. We provide the opportunity to use your ingenuity and experience both in the UK and overseas.

Ideally, applicants aged over 25, would have a formal qualification and/or practical engineering experience in computer applications within the general area of telecommunications. A sound knowledge of computers, peripherals and manufacturers' products is required. An understanding of software engineering and system design would be an advantage.

Benefits include 4 weeks' holiday plus bonus, relocation expenses, pension scheme and other amenities.

To apply, write to or phone quoting ref: K/201, John Callow, IAL, Aeradio House, Hayes Road, Southall, Middlesex. Tel: 01-574 5134.

IAL THE HIGH TECHNOLOGY TASK FORCE
COMMUNICATIONS SYSTEMS
COMPUTER SYSTEMS AND SERVICES
AVIATION SYSTEMS AND SERVICES - WORLDWIDE

(1780)

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Dorset House, Stamford Street, London SE1 9LU.

Ref. 38/2221

COMPUTER SERVICES CO-ORDINATOR

Salary Scale: £9,573-£10,533

(PO2 3-7) Subject to annual review with effect from July 1, 1980

Applications are invited for a new post of Computer Services Co-ordinator within the Northern Ireland Housing Executive.

This is a senior post in the management structure and the successful candidate will be responsible for liaison on behalf of the Executive with all external computer agencies providing an agency service, co-ordinating and monitoring all internal systems and acting as business analyst, when necessary, in assessing and advising upon the introduction of new systems.

Applicants must be educated to degree standard and will have had several years experience as a management consultant assisting in the development of computer systems or as Data Processing Manager with similar experience.

Application forms are obtainable from:
The Personnel Manager,
N.I. Housing Executive,
1 College Square East,
Belfast BT1 6BQ.

Housing Executive

GEC 4000 OS4000 CORAL
Programmers. Senior
Contract or Permanent
Crowthorne 77921 or 3370 day
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Department of Mathematical Sciences & Computing

LECTURERS II (TEMPORARY)

[illegible]

4080

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Among computers designed for real-time applications, the GEC 4080 is acquiring something of a star reputation. In our opinion, that reputation is wholly justified. We should know — we've just invested over £1 million on six 4080's to form the basis of a new internal bureau. The installation has a total of 50 terminals, and provides all the back-up needed by a large scale software engineering group, working on highly advanced real-time applications.

To maintain and extend the services we offer our "Customer", we now need a number of men and women — at team leader, and more junior levels — to maintain, develop and up-date the systems software with particular emphasis on its integrity.

You'd also be involved in the development of new systems software such as utilities, macros and libraries.

For the team leader's role, you'll need at least three years' relevant experience; for the other roles, less experience is acceptable. Experience with GEC Series 4000 computers will obviously be an advantage.

If you like the idea of software support in a real-time scientific environment, Chris Hill can tell you how to find out more.

Why don't you phone him on 01-953 2030 extension 3449.

Alternatively, write to him at Marconi Avionics Ltd, Elstree Way, Borehamwood, Herts WD6 1RX, or telephone 01-207 3455 anytime. Please quote reference MA 80/28.

MARCONI AVIONICS
A GEC-Marconi Electronics Company

(1876)

OPERATIONS

IBM 3031 SENIOR OPERATORS — c£6800
North Surrey site require four Senior Operators with a minimum of 2 years' IBM 370 experience using DOS VS.

IBM 4331 DOS/VSE OPERATORS — £6000
Well-known banking organisation requires senior operators with 1-2 years' JCL and CICS experience.

IBM 370 DOS SENIOR OPERATORS — £6000
City of London Bank are looking for mature operators with 2 years' experience and an understanding of JCL.

IBM SYSTEM 34 OPERATOR — £5000
West End System 34 site require an operator with at least 1 year's experience, days only worked.

IBM SYS 34 CHIEF OPERATOR — £8000
Senior position requiring mature person with supervisory skills to work in this North Surrey installation to control this small but expanding department.

PDP 11/70 OPERATOR — £5500
City-based company are looking for experienced PDP operator preferably with RSTS. Two shifts only.

PDP 11/70 SNR OPERATOR — £6000
Well-respected bank in Central London are recruiting a Senior Operator, usual bank perks, any experience will suffice.

PDP 11/70 OPERATORS — £5800
Middlesex-based company require operators to operate three PDP 11/70s, good career prospects and company benefits.

ICL GII + VME/B OPERATOR — £5500
South-West London based site requires this experience for a secure position in operations.

ICL GII/DME OPERATOR — £6000
North Surrey installation are seeking mature and bright people to enjoy the benefits of this company.

ICL GII + OPERATOR — £5000
Essex installation offer friendly atmosphere and pleasant shift hours. Own transport necessary.

ICL GIII/DME JNR OPERATOR — £4700
This company offers excellent perks and competitive salary, currently under review. Latest software and hardware opportunities available.

UNIVAC OS/9030 SENIOR OPERATOR — £5700
South-West Middx based site requires mature and understanding senior to take pressure and enjoy the rewards of this company.

(1743)

Datascene International Limited, Sceptre House, 169-173 Regent Street, London W1R 7FB. Telex: 28881.
datascene 01-439 7871 24 hour answerphone

Here today, gone tomorrow

The computer systems a company invests in today will be outdated in a year or two, possibly obsolete in five. Yet few computer users have the resources or the justification to update continually — so you, as a professional programmer, have to move companies to keep in touch with changing technology and techniques.

But there's a better way to keep abreast of the industry: with Data Logic's Professional Services Division. As one of Britain's leading software houses, we're in a position to specify and implement the very newest ideas on every assignment for industry and commerce, finance and government clients. We specialise in large-scale, multi-size or multiprocessor systems which often call for a selection of different equipment makes and for very advanced programming techniques. We've even specified completely new languages to meet specific client needs — you can't get more ahead of your time than that!

You'll earn between £6,000 — £10,000 depending on your experience plus profit share and travel expenses — you must be prepared to spend much of your time on customer sites, from a Greenford base.

Either write with full career details, or telephone for further information, to: Barbara Hawkins, Personnel Department, Data Logic Limited, Westway House, 320 Ruislip Road East, Greenford, Middlesex UB6 9BH.
Tel: 01-578 9111. Alternatively telephone our 24 hour answering service on 01-235 1535 for an application form.

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(1749)

Unique Database Development/ Computer Aided Design opportunities: £6.5K–£9K

IN NORTH WARWICKSHIRE a £2.5 million DATABASE DEVELOPMENT FOR DP AND COMPUTER AIDED DESIGN is being set up by a profitable and established manufacturing company with modern offices in rural surroundings.

Our client is replacing current DP facilities with a UNIVAC 1100/60. A DMS 1100 database will support 50 on-line DP terminals within 18 months and CAD systems supporting 14 automated draughting and design terminals are also being installed.

A wide range of outstanding opportunities in an expanding department exist for DP professionals with a minimum of 2 years relevant experience:

Business Systems Development

Responsible for all on-line, database developments for 6 manufacturing sites in the Coventry/ Birmingham area.

- Senior Analysts
- O & M Analysts
- Analysts
- Senior COBOL Programmers
- COBOL Programmers

Technical Systems & Support

Responsible for the UNIVAC 1100/60 and the CAD Systems, with their networks.

- COMPUTER CENTRE MANAGER – a UNIVAC 1100 Operations Management or Network Control background is essential.
- TECHNICAL ANALYSTS – an engineering background with CAD experience is essential although in-depth DP knowledge is not.
- SENIOR SYSTEMS PROGRAMMERS – UNIVAC 1100 software experience essential.

In addition to excellent Salaries, Benefits include:

COMPREHENSIVE RELOCATION PACKAGE
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This is a forward-looking Division of a major British group and career opportunities in the Division and the group are excellent.
So find out more by calling IAN COX on 01-278 6426 (office) or 01-272 2794 (evenings and week ends) – or PAUL GODFREY on the same office number or 049481 4584 (evenings and weekends).

ACS (Consultancy & Support Services) Ltd.
37-39 Bowling Green Lane, London EC1R 0BJ

OPERATORS

SENIOR OPERATOR
WILTSHIRE £7,800
Our clients are seeking senior operations staff who have a minimum of three years' OS/VS1 and JCL experience. The site operates on a 3-shift cycle and many attractive fringe benefits apply together with relocation where applicable. Ref. B 3892

SHIFT SUPERVISOR
SENIOR OPERATOR £6,500 +
N.W. LONDON/MIDDLESEX £5,200 +
We have been asked to assist with recruiting an experienced Shift Leader with a sound DOS/VS VM background. Opportunities also exist for Senior Operators with at least 18 months' DOS/VS experience. The sites will operate on a two-shift system and the many attractive benefits include FIVE WEEKS HOLIDAY, FREE MEALS and a large active SPORTS CLUB. Ref. 94076.

OPERATOR/DATA CONTROLLER
KENT c £6,000
This position would suit an applicant who has gained experience on a Burroughs 700. Ideally the person appointed will have a good operations or accounts background for this DAYS ONLY position Ref. M4091

OPERATOR
MIDDLESEX c £5,000
Our client is a large commercial company based in Middlesex and is seeking an operator with a minimum of 2 years' DEC/PDP experience, using RSX. The company offers excellent career progression. Ref. M4132

OPERATOR
NORTH LONDON c £5,500
Our clients, leaders in their own specialized field wish to recruit two computer operators to join their small friendly department. Applicants should have a minimum of 18 months' experience gained on a 1900 or 2903 site. The position offers excellent fringe benefits Ref. M4102

TRAINEE OPERATOR
MIDDLESEX £3,500
Our clients are seeking a further trainee operator to work on their latest IBM hardware. Applicants must be educated to at least 'O' level standard, aged 18-20 and be of smart appearance. Ref. 82089

PROGRAMMERS

PROGRAMMERS
AVON c £7,000
Our clients are continuing their rolling programme to the benefit of existing and new members with a minimum of eighteen months' COBOL and/or RPGII experience. The sites are all other many developments within the department. Ref. 94009

PROGRAMMER
SOUTH LONDON £6,000
Our client is a major international company and because of continuing growth a minimum of one year's proven knowledge of COBOL should be sufficient experience. The sites are fairly new and offer excellent opportunities for advancement in an expanding environment. Ref. 94118

PROGRAMMERS
SOUTH COAST to £6,000
Attractive opportunities for programmers keen to join a young and dynamic division of 18 months' establishment. Environment is of the latest and the work is interesting and challenging. Training is given where appropriate.

DATA PROCESSING MANAGER
EAST LONDON c £8,000
We are currently recruiting for the position of Data Processing Manager for our clients NCR 8250 site in East London.
This position will suit an experienced Analyst/Programmer who is looking for career advancement and management responsibility.
Applicants should have a commercial systems design experience and good knowledge of a high level language preferably some 2 or an NCR site. Knowledge of NEAT 3 would be an added advantage.
This is an ideal opportunity to join a well-established and expanding company.
There are excellent conditions of service and fringe benefits with the position.
Ref. M4128

SYSTEMS PROGRAMMER
SURREY c £8,000
A major systems company have asked us for assistance with the recruitment of an experienced Systems Programmer.
Applicants should have real-time systems experience using Assembler language on Univac/non-mainframe computers and/or mini-processors. The successful candidate will work on the design and development of a wide range of top quality software.
Some work away from the Surrey base including overseas can be expected.
The company offer excellent career prospects for the right applicant. Ref. M3988

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NATIONAL HOUSE, 66 WARDOUR STREET
LONDON, W1V 3HP
01-439 8481
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PROGRAMMING TEAM LEADER
EAST LONDON To £10,000
We have been asked to assist with the recruitment of a Programming Team Leader for a major insurance company.
Applicants for the position must have a minimum of 4 years' ICL/COBOL knowledge. Real Time systems development and PLAN and supervisory experience would be an advantage.
Our client offers a very attractive package of benefits which include subsidised mortgage, free lunches and annual bonus. Ref. M4141

SYSTEMS ENGINEER
CITY OF LONDON £10,000 + allowances
Applicants must have a minimum of four years' experience of IBM Assembler together with at least two years' IBM DOS. He/she must be sufficiently keen for work (eg. overtime, to be able to provide a reliable all-round support and will be fully responsible for the operation of the total mini system. He/she will be a technical specialist who will design and produce software and carry out some programming. Knowledge of languages like Basic or other programmers is essential. The company offer excellent salary and many fringe benefits including 3 weeks' paid holiday, a [illegible] Ref. M4151

Complete the coupon and return to Effectia Gravis, National House, 66 Wardour Street, London, W1V 3HP, for your next PERMANENT or CONTRACT job.

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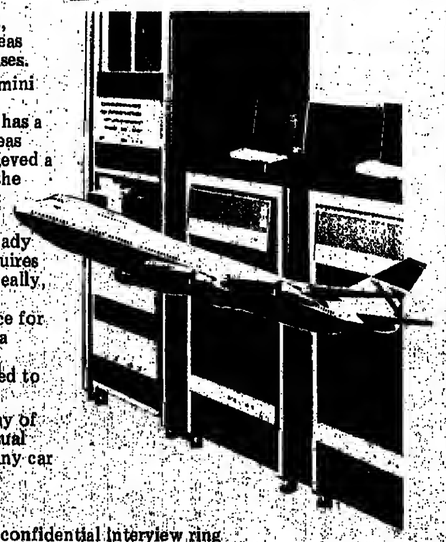

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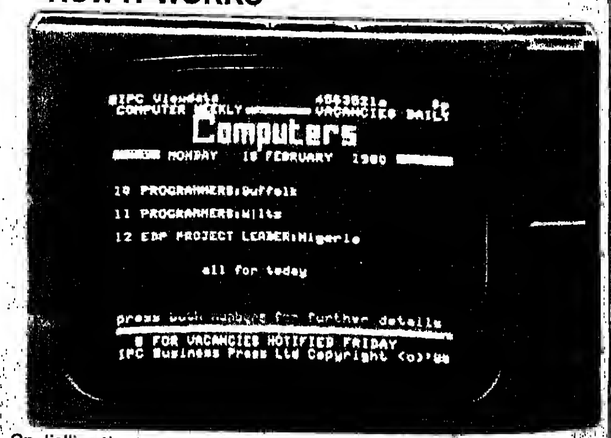
HOW IT WORKS



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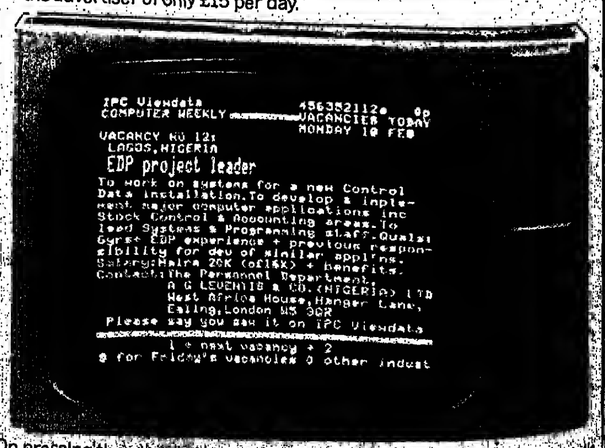

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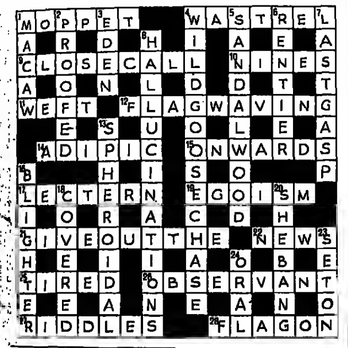
CW Prize Crossword No 5

SOLUTION

WINNER of Computer Weekly Prize Crossword No 5 is Colin Morris, credit controller with wholesale stationers J. A. Magson of York. He receives the first prize of £10. Second prizes of £5 each go to Garry Lockley, an aircraft designer with British Aerospace, and Rachel Britton who works in the computer section of the Engineering Department at Cambridge University.

Prize Crossword No 6 will be published next week, July 3



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THE SALES BIT

Selling in a recession

AS I have said in this column many times before, the difference between sales success or failure is often no more than an attitude of mind.

The winning of the order often depends on the ability of the salesman to sustain a positive stance within the sales situation rather than become involved in the negative dialogue of all the reasons why success is unlikely.

Once again we are apparently entering a period of worldwide economic recession. I have always believed that there is nothing more likely to create economic recession than politicians and economic pundits forecasting that we are about to have one.

One could almost believe that economic recession is a standard product of Rent-a-Disaster, a service company specialising in the provision of calamities that appear to justify the government of the day and sustain full employment for MPs. But, I digress!

In periods of impending or existing economic decline the buyer is given the best excuse in the book for not buying, and for many salesmen such circumstances provide an ideal excuse, not only for failure, but also for not getting out in the street and even trying to sell.

What actually happens to the buying process during times of recession? Clearly it depends on the type of product one is selling. Luxuries are obviously hit harder than essentials. However, it is fair to say that almost no market dries up altogether; there is always business around somewhere.

It is in this kind of environment that the determination to get out there and win enables some salesmen to shrug off the apparent limitations of economic recession and still make sales quota, while others sit in their offices whining over copies of the Financial Times, cursing the fates for their ill fortune.

One can argue quite convincingly that any service or equipment designed to promote efficiency must have greater justification in times of industrial restraint than during economic boom. If savings are to be made they can only be achieved by increased productivity and not by putting up the shutters and hoping the problem will go away. It is an argument that needs a resolute and determined mind. But it has always been the salesmen's responsibility not only to persuade the buyer to purchase his product as opposed to that of a competitor, but also to provide the justifications for the type of product concerned in terms of cost benefits in the context of prevailing circumstances.

Often the promise of recession can provide an ideal opportunity for the salesman to close an extended negotiation: "Now that there is some likelihood of economic difficulties that could affect your industry quite considerably, it is most important that you take every possible step to raise your efficiency to the highest level in order to ensure survival in what will be an increasingly competitive marketplace. A decision to proceed now, while funds can still be made available, will avoid a possible situation where you are in urgent need of increasing efficiency without the ability to fund it."

You could be selling anything — photocopiers to aero-engines, vending-machines to computers. The argument is still the same.

When it comes to selling any non-luxury product, the buyer's use of a statement that sounds anything like "I cannot make a decision because of prevailing economic circumstances" is not providing a reason; he is making an excuse.

TRADER

Fortronic moves south

FORTRONIC of Dunfermline, Mannesman Tally distributor in Scotland, is to extend its territory south of the border to become the exclusive sales and service agent for Northumberland, Cumbria, Durham, Tyne & Wear and Cleveland. An office is to be opened in Newcastle.

Midlands office

A NEW Midlands office has been opened by SMR Sales and Marketing Services, which incorporates SMR Sales and Marketing Recruiters. It is at Barclays Bank Chambers, Bore Street, Lichfield, Staffordshire WS1 3ONB. Tel: Lichfield (0543) 32) 56612.

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UK distributor for Sanders Vario-Printers and DTI visual display terminals, Advent Data Products, is moving to larger premises. The new address is Merlin Way, Bowerhill Industrial Estate, Melksham, Wiltshire. Tel: Melksham (0225) 706389.

Info Bristol

TO handle sales and support in SW England and South Wales, CMC has opened an office in Bristol. The address is: St. Stradbroke's House, 29 Great George Street, Bristol BS1 5QT. Tel: 0272 21301.

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TO accommodate expanding business, software and systems house Quintime has new premises at 17 Bedford Square, London, WC1B 3JA, where its Prime 400 computer is now installed. The telephone number is 01-637 7061.

Nelson touch

TO sell and maintain its complete range of peripherals in the North of England, Decision Data Computer has appointed Nelson Computer Services of St John's Court, Bacup Road, Rawtenstall, Lancs. Tel: Rossendale (07062) 29125.

Puzzle Answer

ALL fifth powers have the same final digit as the original number, so the last figure of 157⁵ must be a 7.

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